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USSR Report

SCIENCE AND TECHNOLOGY POLICY

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USSR REPORT
SCIENCE AND TECHNOLOGY POLICY

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PARTY CONGRESS DELEGATES ON INTENSIFICATION OF PRODUCTION

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 5, 4-17 Mar 86 pp 4-5

[Article under the rubric "Delegates of the 27th CPSU Congress Speak": "A Sharp Turn Toward the Intensification of Production"; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] All the national economic units of the country and all labor collectives are called upon to ensure the acceleration of scientific and technical progress. The delegates--President of the Latvian SSR Academy of Sciences B.A. Purin; A.Sh. Syrtlanov, chief engineer of the Bashkir Petroleum Production Association; N.V. Volodkov, a fitter and electrician of the Minsk Machine Tool Building Plant imeni S.M. Kirov; and A.P. Voronin, first secretary of the Chkalovskiy Rayon Committee of the CPSU of Sverdlovsk--ponder over how to achieve this.

B. Purin: "The establishment of interbranch scientific technical complexes is a new stage of the interaction of science with production, which ensures the shortest implementation of the cycle--from the idea to introduction."

While attaching, as before, priority importance to the development of basic research, the republic academies of sciences at the same time should carry out more vigorously the turn to the needs of the national economy. The congress is aiming scientists at this.

Today it is required of the academy not only to broaden the research which has a technical orientation, but also to become the coordinator of all the scientific research work (not only basic scientific research work, which was previously the case), which is being performed in the republic. We began by engaging in the analysis of the activity of sectorial scientific research institutes and planning and design organizations. By getting a clear idea of which sectors are engaging in development of a scientific research nature, in what amount, and at what level, the academy will be able to influence even more actively the themes and structure of sectorial science and to distribute the scientific potential more efficiently in the most important directions of research.

We have some experience of cooperation with sectors and higher educational institutions, since the solution of regional problems in Latvia is taking

place through the cooperation of the Academy of Sciences with the republic State Planning Committee, through the formulation of comprehensive goal programs jointly with sectorial institutes, higher educational institutions, and industrial enterprises.

In this way the interaction of academic science, science of the higher educational institution, and sectorial science is being ensured. But given such, it would seem, organized interaction there are still serious difficulties. They are connected mainly with the different departmental affiliation of the cooperating organizations and with the fact that there are many organizations of union subordination in the republic. The difficulties had to be overcome by various means. And the large number of means itself testified to the fact that the optimum form of interaction until recently had not been found.

Now, so it seems to us, it has appeared. Departmental barriers should be eliminated by the recently established interbranch scientific technical complexes (MNTK), in which we are placing great hopes. The Latvian SSR Academy of Sciences is participating in two union complexes, the Anticorrosion and Biogen Complexes. In addition to this, having specified in its activity for the future seven priority scientific research directions, the academy jointly with the republic State Planning Committee has begun the establishment of the corresponding republic complexes. In our opinion, the efficiency of the work of interbranch scientific technical complexes will depend in many respects on the strength and authority of the management which runs the complex, regardless of the departmental affiliation of the organizations which make it up. Scientific supervision should be at a high level.

Special-purpose financing with the right of the main organization to distribute assets among the performers is also necessary.

The establishment of interbranch scientific technical complexes is a new stage of the interaction of science with production, which ensures the shortest implementation of the cycle--from the idea to introduction. Therefore, we are also linking with the complexes hopes for the rapid introduction in the national economy of academic developments.

The Latvian SSR Academy of Sciences in a number of most important directions of basic and applied research has attained leading positions in the Soviet Union. Among these directions it is possible to name magnetohydrodynamics, the mechanics of composite materials, biotechnology, the plasma chemistry of inorganic compounds, the synthesis of compounds for medicine and agriculture, and others. Products are being produced in accordance with technologies, which were developed at institutes of the republic academy, at enterprises of not only Latvia, but also the entire country. Thus, the method of producing lysine, which makes it possible to increase by 2.5-fold the yield of this product, has been introduced at several biochemical plants. Practically all domestic production of citric acid has been converted to a new biotechnological process, which as compared with the best world indicators increased the yield of citric acid by 20-30 percent. I have cited as examples technological solutions which have found extensive application. Unfortunately, of the 650 developments of the academy, which were introduced

in the national economy of the country during the 11th Five-Year Plan, a significant portion were used at only individual enterprises.

If we examine the existing chain: research institute--special design and technological bureau--pilot plant--industry, it is possible to find "bottlenecks" in any of the links. I will speak only about the experimental and experimental design base. Without it we cannot carry out effectively the introduction of our developments. But during the past two five-year plans the republic academy has lagged seriously in the development of its own special design and technological bureaus and pilot works. Recently this question was discussed at a meeting of the Presidium of the Latvian SSR Council of Ministers. It was specified that objects of science will become priority ones for the republic Ministry of Construction. However, a number of problems still require their solution. We, for example, are waiting impatiently for the approval of the new statute on pilot works. The point is that for the present the basic indicators are planned for these works in the same way as for ordinary industrial enterprises. As a result the development of new equipment and technology is being hampered.

In our opinion, it would be advisable to change the general system of the planning of the personnel and financial structure of the academy. The staff size and the wage fund are now planned for the academy as a whole with respect to three items: "science," "scientific service," and "miscellaneous" (pilot enterprises are in "miscellaneous"). We do not have the right to redistribute the limits among these items, which deprives the academy of maneuverability.

And there is another question which is very important for us. In order to organize within an academic institute a small special design and technological bureau, a decree of the USSR Council of Ministers is needed. We were convinced of how difficult and long this path is, when establishing the Anticorrosion Special Design and Technological Bureau of the Institute of Inorganic Chemistry. We believe that the republic Council of Ministers could promptly settle such questions in consultation with the USSR State Committee for Science and Technology and the Presidium of the USSR Academy of Sciences.

The 27th CPSU Congress is posing the task to turn science into a powerful productive force. The Latvian SSR Academy of Sciences has defined for itself the basic means of accomplishing the posed task. Among these means are the intensification of the coordinating work on all the research being conducted in the republic; the concentration of efforts on priority scientific research directions; the further development of its own design and experimental base; the large-scale introduction of academic developments.

But the new level of the tasks also requires the updating of the structure and organization of science. It is necessary to solve a number of problems (I have touched upon only a portion of them). Then the contribution of the academy to the acceleration of scientific and technical progress, undoubtedly, will be of an even greater scale.

A. Syrtlanov: "Of course, the use of the achievements of science and technical is the most important reserve of the increase of efficiency and quality."

On the eve of the opening of the congress the collective of the Bashkir Petroleum Association for the early fulfillment of the assignment of the 11th Five-Year Plan was awarded the Challenge Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the All-Union Central Council of Trade Unions, and the All-Union Komsomol Central Committee. We were able to additionally produce more than 1 million tons of "black gold." On what does success depend? On much: here there are both the efficient, proper organization of labor at the fields and coordination in the actions of workers of related industries, geologists, drillers, operators, and repairmen. But the ability to use the reserves of the increase of the efficiency and quality of work is no less important. I am confident that they exist everywhere, but at times it is not as easy to find these reserves as it is to find a new rich deposit.

In Bashkiria petroleum has been produced for more than 50 years. Of course, each new ton of it is being obtained with greater and greater difficulty. In order to increase production, it is necessary to go either deeper or farther, that is, to develop new deposits. Both means require large material expenditures, while the desired result is not always achieved. We decided to make an audit of old fields and to show that they can still yield a substantial increase of production. First of all we directed attention to the quality of the operation of wells. Their repair gives oilmen much trouble. The process is unpleasant but, unfortunately, inevitable. By means of the proper operation and timely preventive maintenance of wells and the introduction of new equipment we were able to increase the overhaul life to 415 days. This is the best indicator in the sector, but several of our leading fields have achieved record times--480-500 days.

But, of course, the use of the achievements of science and technology is the most important reserve of the increase of efficiency and quality. For, as was noted in the Policy Report of the CPSU Central Committee, for the successful accomplishment of the modernization of the national economy it is extremely important that production would be most receptive to scientific and technical achievements.

Last year alone more than 70 recommendations of scientific research and planning institutes, which yielded an economic impact of 9 million rubles, were used at the fields. The technology of drilling wells with the use of foam systems in combination with downhole screw motors proved itself to be rather good. It significantly improves the technical and economic indicators of drilling and speeds it up. Important development is being conducted in the area of the improvement of the system of the gather of petroleum and the protection of oil field equipment against corrosion. Thus, specialists of the Bashkir Scientific Research and Planning Institute of the Petroleum Refining and Petrochemical Industry and the VNIISTPneft jointly with colleagues of the All-Union Thermal Processing of Petroleum Research and Production Association at the fields of Bashkiria tested new corrosion inhibitors. They proved themselves to be good in operation. The problems of the utilization of corrosive stratal water, the exposure of water-bearing formations with increased pressure, and the prevention of asphalt-resin-wax deposits in the process of petroleum recovery are being successfully solved.

The assistance of science in solving the problem of increasing the petroleum yield of formations is especially appreciable. Bashkiria is one of the regions, in which the most reassuring results were obtained. Not by chance was the All-Union Soyuznefteotdacha Scientific Production Association established here.

Members of the scientific and technical society of the petroleum and gas industry are making a considerable contribution to the introduction of new developments. For example, with their assistance at the Arlanskiy deposit an experiment on the consolidation of the network of wells is being conducted, which promises an increase of the petroleum yield of formations. A technology of the operation of wells with the boosted recovery of liquid was introduced at the same deposit. Specialists of the Arlanneft Petroleum and Gas Production Administration developed a differential mixing chamber, which is making it possible to increase the life for nearly 60 wells, which were planned for shutdown, and to obtain from them nearly 80,000 tons of petroleum.

However, the pace of the introduction of several innovations does not suit us. I know that many scientific and planning organizations have expanded the range of their research, but then the return from this has not increased. The point is, in my opinion, that the intermediate result, and not the end result, more often suits scientists. Let us take, for example, the same corrosion inhibitors. In recent years many of them, which, moreover, are quite effective, have been developed. But the developments are reaching only the pilot industrial stage. Commercial assimilation is being greatly dragged out, many obstacles are proving to be in the way to production. As a result we are experiencing to this day a most acute need for inhibitors. This year the State Committee for Science and Technology and the USSR Academy of Sciences established the Anticorrosion Interbranch Scientific Technical Complex for the coordination of developments and the organization of their production. We hope that in the immediate future the needs of petroleum producers for inhibitors will begin to be met.

I can say with confidence that the Bashkir oilmen do not have to borrow skill and persistence in production. But today, when the congress has posed for the sectors of the fuel and power complex difficult, responsible tasks, it is impossible to rely only on enthusiasm. The oil fields need heavy-duty technical and technological equipment.

N. Volodkov: "Without the mass participation of engineers, technicians, and workers in the solution of vital production problems it will be difficult to achieve the acceleration of scientific and technical progress."

Not only scientists have to solve the problems of the acceleration of scientific and technical progress. At the congress it was stressed: it is necessary to make room for the initiative and creativity of the masses. Indeed, without the mass participation of engineers, technicians, and workers in the solution of vital production problems it will be difficult to achieve the acceleration of scientific and technical progress.

During the years of the 11th Five-Year Plan, owing to the introduction of inventions and efficiency proposals, an economic impact of about 7 million rubles was obtained at our enterprise. The innovators helped to save nearly 900 tons of ferrous and nonferrous metals and 642,000 kilowatt-hours of electric power, it was possible to decrease the labor intensiveness by more than 230,000 standard hours. For 3 years in a row, from 1982 to 1984, we came out the winners in the socialist competition of efficiency experts of Minsk Oblast. As you see, the achievements are rather good. But this does not mean that there are no problems with the activity of innovators.

Invention and efficiency promotion are a creative process, which it is necessary to manage skillfully. By management I, of course, mean both that research should be aimed at the solution of precisely the problems which are most important for production today and that it is necessary to orient innovators not toward the "gross" of proposals, but toward the achievement of the greatest efficiency from each of them. To manage skillfully means both to enlist a larger number of people in creative technical work and to plan their activity wisely and in a justified manner.

Last year the plant exceeded by more than 1.5-fold the plan of the obtaining of an economic impact from the introduction of inventions and efficiency proposals. For 1986 a figure lower than the 1985 assignment has been planned with respect to this indicator (incidentally, during all the preceding years of the 11th Five-Year Plan the actually obtained saving greatly exceeds the among of the planned saving for this year). Why are we being cautious? I believe that the point is precisely that we have not yet learned to regulate properly the activity of innovators: we do not know whether a major invention "will pop up" this year or on how many highly effective efficiency proposals it is possible to count.

I am not at all appealing to plan from what has been achieved. I repeat, in creative technical work not the gross, but the quality of the proposed technical solutions is important. But if the production plan should be intense, why is an easier version of the assignment on efficiency promotion and invention possible? For in the end one is interconnected with the other. In my opinion, such planning leads to work on minor themes and the decrease of creative activity and what is more simply checks the use of good proposals (since the plan has been fulfilled, it is possible to hold something back).

At our plant, just as everywhere, so-called subject reference lists of "bottlenecks" are being compiled. But they are drawn up for several years in advance, you will not provide in them for problems, which arise suddenly and which it is necessary to solve immediately. Therefore, it is natural that a significant portion of the proposals of innovators is not in accordance with the subject reference list. But how many important problems we are still missing! If only because there are simply not enough eyes and hands.

At the plant there are 370 inventors and efficiency experts. While in all more than 2,800 people work here. In reports it is customary to indicate the number of innovators per 100 workers. At our enterprise this ratio appears as follows: 13 to 100. For the sector it is a rather good indicator, but for

Minsk we are among the middling people. In the city there are enterprises at which many more people are engaged in creative technical work.

Of course, it is impossible to join inventors and efficiency experts. People become them. But the council of the All-Union Society of Inventors and Efficiency Experts and the department of scientific and technical information, efficiency promotion, and invention, which operate at the plant, should help one to become acquainted with creative technical work. They are in general performing much work: the school of the young efficiency expert is operating, we are familiarizing ourselves with the achievements of innovators of other enterprises of the city, and several schools of advanced know-how are organized during the year at the plant. But this, as is evident, is insufficient, since the ranks of inventors and efficiency experts are being reinforced slowly. We have surprisingly few young innovators. Of the 900 boys and girls, who work at the enterprise, only 55 are taking part in creative technical work. But young people are the future of the enterprise. If a taste for creative work is not instilled in them now, soon matters with invention and efficiency promotion will be poor.

Every enterprise is interested in having more innovators. Not only the increase of the number of inventions and efficiency proposals, among which it will be possible to choose the most significant ones, is behind this. If a person ponders over what it is possible to improve at the works, hence, he is worrying about his section, his shop, and his plant.

A. Voronin: "In the drive for scientific and technical progress party supervision should first of all consist in the utmost support of the creative initiative of the working people, heightened attention to people--to what we call the human factor."

A fourth of the output of industrial Sverdlovsk is produced in Chkalovskiy Rayon of the city. These are the fruits of the labor of more than 20 collectives of machine builders, metal workers, and transportation workers, 9 scientific research institutes and planning organizations, 3 sovkhozes, and a number of enterprises of light and the food industry and other sectors of industry. More than 3,000 scientific associates live and work in the rayon, among them there are more than 100 candidates and 9 doctors of sciences. We are entering the period of radical modernization with such an impressive potential of forces and assets.

The work of party organizations and economic managers of all ranks is being conducted along the lines of the recommendations of the oblast applied science conference on the introduction of the achievements of science and technology in production, which are being drawn up for the five-year plan.

I have been working in the rayon for more than 4 years. Prior to this I had to good fortune to work a quarter century at the Uralkhimmash Production Association--a fine enterprise which is well known far beyond our city. There I covered the path from design engineer to deputy chief of production and secretary of the party committee. The experience of my work--both at the works and in the rayon committee--makes it possible to assert that in the drive for scientific and technical progress party supervision should first of

all consist in the utmost support of the creative initiative of the working people, heightened attention to people--to what we call the human factor. "All our plans will hang in the air, if we are not able to arouse the labor and public activeness of the masses, their energy and initiative"--this idea, which was voiced by Comrade M.S. Gorbachev, should become the main principle here.

I will cite just a few examples.

The program of the renovation of operating works is urgent for us. At the enterprises of the rayon there are more than 20,000 obsolete machine tools and units. Half of the equipment, for example, of the tire plant was installed 15 years ago, while 37 percent was installed 5 years earlier. There is much obsolete equipment at the elevator building plant, the tobacco factory, the Uralelektrougol Plant, and the plant of industrial rubber items.

True, renovation for us is not a new form of the improvement of production: the experience of the Ural workers in its accomplishment with the minimum expenditures has already been endorsed by the party Central Committee. However, this inexpensiveness does not come easily: the economic mechanism has not yet been readjusted for work under such conditions. Hence, it is necessary to rely on the interest, initiative, and enthusiasm of people.

At the Uralkhimmash Production Association they take natural pride in the complex of initial processing shops. This is a truly automated works for the cutting of blanks made of metal. Here laser and plasma cutting and computer technology have been successfully used. The establishment of such an initial processing works is a result first of all of the persistent actions of General Director of the Uralkhimmash Production Association V.M. Makarov, chief engineer N.K. Globin, and the party committee of the plant. Among other things these managers saw to it that the very construction of the complex would be carried out by advanced methods.

The plant conditions formed in such a way that the construction workers should have increased labor productivity by twofold as against the usual. Purely technical measures did not make it possible to achieve such acceleration, here the human factor also came to the forefront: they decided to organize labor in a new way and to teach people to "worry" about its end result. The construction workers were given the opportunity to make the decisions themselves, but also to implement them themselves. And the reliance on independence, responsibility, and confidence in the collective completely justified itself: the object was turned over ahead of time, moreover, with an excellent rating.

There is another example. The Sverdlovsk Scientific Research Institute of Chemical Machine Building is in our rayon. Formally this institute does not have plans of the improvement of technological processes at enterprises of the rayon and city. The regular diversion of workers of industrial enterprises and scientific institutions for agricultural operations was one of our urgent problems. But the staff members of the Sverdlovsk Scientific Research Institute of Chemical Machine Building considered such labor expenditures unreasonable and solved the problem on their own. At the institute the

combine for harvesting carrots was redesigned--developed anew, it can be said--and other agricultural operations were mechanized. As a result of the increased labor productivity the sovkhozes began to manage more on their own and we decreased significantly the diversion of workers and engineers from their basic occupational duties.

Today it is especially clear that every communist should have the ability, even the inclination to take on a load, to bear responsibility, and to agree to take risks if necessary. To clearly choose a position, to firmly maintain it, and to vigorously make a way in the world for what is new. Party influence on the human factor of the acceleration of scientific and technical progress should contribute in every possible way to this.

The materials were prepared by Yu. Ishmayev, O. Lebedeva, and G. Sidorova.

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BOOKS EXAMINE PROBLEMS OF MANAGING S&T PROGRESS

Moscow SOTSIALISTICHESKIY TRUD in Russian No 2, Feb 86 pp 115-118

[Article by I. Dreytser under the rubric "Criticism and Bibliography": "The Problems of the Management of Scientific and Technical Progress in Economic Literature"]

[Text] The party is placing the cardinal acceleration of scientific and technical progress in the forefront as the main strategic lever of the increase of production efficiency, the intensification of the national economy, and the better use of the accumulated potential.

The most important directions of the acceleration of scientific and technical progress in the sectors of the national economy today are the substantial increase of the effectiveness of research; the elaboration and implementation of a set of economic and moral measures which would stimulate the work on the updating of equipment and technology; structural and organizational innovations which are aimed at the improvement of the use of the scientific and technical potential of the country.

The problem of improving the management of scientific and technical progress for the purpose of the substantial shortening of the "research--production--application" cycle is being discussed extensively by economics scholars and experienced workers. In the opinion of V.A. Pokrovskiy, for its solution it is necessary to use an interconnected set of planning and economic levers. In his monograph "Uskoreniye nauchno-tehnicheskogo progressa: organizatsiya i metody" [The Acceleration of Scientific and Technical Progress: Organization and Methods] (Moscow, Ekonomika, 1983) he examines the urgent theoretical problems of the acceleration of scientific and technical progress at all levels of the management of the national economy. The emphasis is placed on such new aspects as the optimization of the structural interrelations of the scientific and technical potential and the production potential, modern methods of the intensification of scientific activity, the management of intersectorial, sectorial, and regional relations in the sphere of scientific and technical progress, and others.

It is especially possible to single out in the monograph a group of problems which concern the goal program planning and management of scientific and technical progress. (Footnote 1) (The methodology of the goal program

approach has been covered well in our economic literature. In particular, it is possible to cite the work "Nauchno-tehnicheskiy progress: programmnyy podkhod" [Scientific and Technical Progress: The Program Approach], which was published in 1981 by the Mysl Publishing House under the editorship of Academician D.M. Gvishiani) First of all I would like to direct attention to the evaluations of such a significant structural functional component of the goal program approach, which the extradepartmental appraisal of the technical and economic indicators of the most important types of equipment being developed and technological processes at the stage of the technical assignments and end results, as well as the material and technical supply of programs (Chapter III) are. It is no secret that the gap between the indicators, which were declared during planning and were actually achieved as a result of the completion of research (development), stems along with other factors also from the lack of the proper appraisal of research programs. However, it seems to us that it would be more correct to make a reading starting with the stage of the technical and economic substantiation of the themes being announced. While broadening in every way the goal program planning of science, one should not ignore any of the economic mechanisms inherent in it. Let us recall, for example, that in the United States, where the methodology of the goal program approach to the planning of scientific research originated, such an appraisal became firmly established long ago (and, undoubtedly, has justified itself). (Footnote 2) (See Ye.A. Lebedeva and P.A. Nedotko, "Programmno-tselevoy podkhod k nauchnym issledovaniyam v SShA" [The Goal Program Approach to Scientific Research in the United States], Moscow, Nauka, 1980)

V.A. Pokrovskiy, unfortunately, does not propose any organizational structural embodiments of the extradepartmental appraisal of research programs and the obtained results. But meanwhile precisely with respect to many things the success of this work depends on its organization. In any case the now established system of expert self-service (a method of the preparation by authors of a superficial opinion of the quality of the work performed by them, which has carried to the point of absurdity) by no means contributes to the increase of the effectiveness of research.

In the monograph of V.S. Muchnik and E.B. Golland "Ekonomicheskiye problemy sovremennoogo nauchno-tehnicheskogo progressa" [Economic Problems of Current Scientific and Technical Progress] (Novosibirsk, Nauka, 1984) the trends of scientific and technical development are evaluated mainly with respect to the technological criterion. The authors study the directions of scientific and technical progress in traditional technology, as well as the efficiency of the development of new technologies which mainly have few operations and, consequently, have a significant labor-saving potential. The new methodological approaches, which are used in the first chapter, are interesting.

The directions of scientific and technical progress are evaluated in the book with respect to a number of sectors of the investment complex (ferrous metallurgy, construction, the fuel and power sectors). Such a view of the problem of the intensification of scientific and technical development makes it possible to picture better the main trends and to substantiate the conclusions and reveals more clearly the reserves of efficiency, which are

still not being used effectively enough. In particular, the comparison of the traditional methods of using energy resources in the national economy with the mass use of catalytic heat generators (Table 2.21) leads to such conclusions. In the opinion of the authors, the mass dissemination of important directions of technical progress yields a greater impact than minor improvements of traditional technology. For all the importance of the increase of the energy potential of the country the implementation of the directions of the energy-saving policy in all sectors of the national economy is no less important (p 182).

In the monograph the regional aspects of scientific and technical progress are examined on the basis of the example of Siberia. The choice of this region for analysis in the indicated context stems from the fact that the policy of labor saving here is especially urgent. Let us note that the regional aspects of the problem of accelerating scientific and technical progress today are attracting many researchers. The need for the harmonious combination of the interests of sectors and territories, which is appearing more and more persistently, and the active search for the efficient use of the sectorial and regional forms of the management of the national economy find reflection in this.

At the June 1985 conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress it was stressed that the basic reserves in the achievement of the greatest efficiency lie at the meeting points of sectors. In this connection I would like to direct the attention of the readers to the collective monograph "Problemy regionalnogo upravleniya nauchno-tehnicheskim progressom. Teoriya. Metodika. Praktika" [Problems of the Regional Management of Scientific and Technical Progress. Theory. Methods. Practice] (Moscow, Nauka, 1984). The experience of the Ukrainian SSR Academy of Sciences in the establishment of organizational structures of the management of scientific and technical progress on an interdepartmental basis is reflected in it. The evaluation of the effectiveness of these structures, in the conviction of the authors, should be multicriterional and encompass both the qualitative and the quantitative aspect. Among such new organizational structures, which have been established in the Ukraine, there are singled out, in particular, interdepartmental special-purpose scientific production associations (MTsNPO) and interdepartmental special-purpose scientific production complexes (MNPK), which have been operating successfully in a number of regions since the second half of 1976. In Kiev, for example, six regional scientific and technical goal programs have been formulated: on the reduction of manual labor, the decrease of the metal content of products, and others. The experience of the Institute of Electric Welding imeni Ye.O. Paton of the Ukrainian SSR Academy of Sciences is especially interesting.

Incidentally, as the authors admit, the problem of ensuring cooperation in the acceleration of scientific and technical progress within sectorial and territorial organs remains a difficult and for the present a still theoretically and practically unsolved one. It seems that the lack of a unified administrative superdepartmental element here tells just as painfully as in the management of territorial production complexes (TPK), which are an interesting form of the organization of the economy. In any case nostalgia

with respect to such an organ is very clearly traced in the monograph. In this connection the suggestion on the establishment of a regularly operating organ, which would become the nucleus of the forming systems of the territorial management of scientific and technical progress in the oblasts--the technical (scientific and technical) administration of the oblast soviet executive committee, which is headed by one of the deputy chairmen--is interesting (p 51).

Models of the management of the scientific and technical potential in the territorial structures in question are offered in the seventh chapter of the named monograph. In particular, the quantitative evaluations contained here (the magnitude of the potential, the level of support of the programs, the substantiation of the supply of intersectorial associations with production capacities, and others) are aimed at filling the gap in the standard base of the management of science. True, they are only of a recommended nature, but acquaintance with them can be useful. In case of the designing of organizational structures of management such information is capable of prescribing the necessary scale of the evaluations. What has been said is also equally correct for the preceding chapter, in which the methodological principles of the standardization of expenditures for the implementation of scientific and technical comprehensive goal programs are discussed.

In our opinion, the approach of the authors to the problem of the formation of active receptivity to innovations on the part of production merits attention. The problem arose long ago, but never received adequate coverage in scientific literature. The examination of the social aspects of the formation of creative collectives of intersectorial special-purpose scientific production associations and the means of the development of the innovative mobility of production collectives was dictated by the need for its study.

In the complex "research--development--introduction" system a special place belongs to sectorial scientific research institutes and design bureaus, which mediate the contact between basic science and the needs of practice. The monograph of A.S. Palamarchuk and R.P. Kazakova "Otraslevaya nauka i effektivnost proizvodstva" [Sectorial Science and Production Efficiency] (Moscow, Moskovskiy rabochiy, 1984) is devoted to the analysis of the efficiency of applied science on the basis of the example of a number of leading sectors of Moscow. Science and scientific service in the level of employment hold second place in the city after industry, while significantly leading it in the growth rate. In the work, which does not lack, unfortunately, excessively general discussion, the study of the means of intensification and the reserves of the increase of the influence of scientific organizations on production efficiency merits attention. The classification of the organizational reserves of the intensive development of scientific production, which is proposed by the authors, is interesting. The book also contains an analysis of the efficiency of the use in sectorial science of collective forms of the organization of labor (so-called functional, thematic, and mixed brigades, in which the most advanced systems of the remuneration of labor, particularly the piece-rate system, have been introduced).

Among the economic reserves of the increase of the influence of science on production the authors of the book single out the improvement of the planning of research and development, which, in their opinion, it is advisable to carry out in two directions: by improving the planning of the activity of the scientific organization as a whole, as well as the system of the internal industrial planning of the work of structural subdivisions. This presumes first of all the development of a standard method of the scientific and technical, economic, financial, and social planning of scientific research institutes and design bureaus, which is a detailed program of the activity of the organization, which is aimed at the successful fulfillment of the plan assignments in case of the most complete use of the scientific and technical potential and at the obtaining of the maximum results with the minimum expenditures (pp 87-88).

The combination of current economic indicators with long-range economic indicators, which are called upon to play a leading and guiding role with respect to the current indicators, in the opinion of Corresponding Member of the USSR Academy of Sciences L.M. Gatovskiy, is one of the decisive prerequisites of the successful accomplishment of scientific and technical progress. The pace of scientific and technical progress, which in essence is oriented toward the future, is being checked by the fact that the five-year plan in practice has not yet become the basic form of planning. The planning of scientific and technical progress, L.M. Gatovskiy believes, should be based on a long-term strategy with the separation of the stages of its implementation by 5-year periods and with the real transformation of the five-year plan (starting with the 12th Five-Year Plan) into the main form of planning and of the long-term standards, which are connected fundamentally with stimulation, into vital levers of management. (Footnote 3) (See L.M. Gatovskiy, "Economic Questions of the Acceleration of Scientific and Technical Progress," VOPROSY EKONOMIKI, No 2, 1985, p 5)

In this connection the collective monograph of the Institute of Economics of the World Socialist System of the USSR Academy of Sciences, "Mekhanizm integratsii nauki s proizvodstvom" [The Mechanism of the Integration of Science With Production] (Moscow, Nauka, 1984), is of interest. A wide range of questions which are connected with the experience of the management of scientific and technical progress in the European CEMA countries--from the organizational conditions of the convergence of science with production to the evaluation of the role of socialist competition in the intensification of scientific and technical development--is examined in it. Within this subject framework are the long-range planning of scientific and technical progress, pricing, financing, the methods of evaluating the activity of economic organizations, and the forms of material stimulation. In other words, an attempt is made to interpret the essence of the management of scientific and technical progress. In the search for a common gauge of the work, which is multidimensional in content and is being performed in the CEMA countries on the intensification of scientific and technical development, the authors place the emphasis on the effect of labor saving both in the sphere of science itself and in case of the use of its achievements in other spheres.

The organizational forms, in which the conditions for stable economic progress are being realized in the CEMA countries on the basis of the comprehensive

introduction on a national economic scale of the achievements of scientific and technical progress in production, are of definite interest. They, of course, are different and depend on the general model of the economic mechanism and the specific national nature, traditions, and so forth. For example, in Bulgaria what is called the "multiplication approach" is being used as an organizational means of the comprehensive solution of the most important economic problems in the systems of similar works regardless of their departmental affiliation. In the GDR this work is being carried out within the framework of large combines, which are recognized as the basic organizational form of the solution of strategic problems, the main one of which is the utmost acceleration of the assimilation of scientific and technical progress. The Czechoslovak system of coordination, which in contrast to the GDR until recently was not rigidly linked with any specific form, is distinguished by its own specific nature. One of the new trends is the establishment of permanent feedbacks of scientific and technical units not only with production, but also with the subdivisions for the selling of products.

The forms which are new for the conditions of the socialist countries--so-called contractual associations (the GDR, Poland, the CSSR, Hungary)--are also contributing to the convergence of science with production. The attention to research, which either involves substantial risk or in its nature is not intended for rapid introduction in production, has been increasing in recent years. For the purpose of the production and the organization of the introduction of such innovations in Bulgaria the Progress Center (80 staff members, the compensation of expenditures is from the profit which was derived owing to the introduction of innovations) was established under the State Committee for Science and Technical Progress. In Hungary the so-called Innovation Fund, which exists with the rights of an affiliate of the Hungarian National Bank, is an organization similar in nature.

Among the economic factors of the acceleration of scientific and technical progress pricing is recognized as one of the most important. Its improvement in the CEMA countries is being carried out in many directions. This question is examined in the third chapter of the monograph.

A multidimensional and multistage process, such as scientific and technical progress is, has its crowning phase--the embodiment of the results of research and development in specific items and technological processes. The ultimate effectiveness of scientific and technical progress and the productivity of the efforts, which society expends on the maintenance and development of science, depend on the introduction of the achievements of science and technology in production, this most crucial thing in the functioning of the productive forces of society. Science is becoming an immediate productive force, introducing extensively its own achievements.

The experience of the developed capitalist countries in the development of an organizational and economic mechanism of the introduction of the achievements of science in production is of considerable interest. Thus, in the United States the late 1970's and early 1980's were marked by a substantial increase of scientific research undertakings and, what is especially indicative, in the most decisive directions of scientific and technical progress: in the field

of microprocessor equipment, the development of "thinking" machines (fifth generation computers), energy-saving "small-scale" technology, biotechnology, aquaculture, and so on. This process is intensifying, in spite of the crisis state of the American economy, which testifies to the scale of the scientific and technical revolution and its encompassing of new aspects of the intellectual production activity of society. Ye.A. Lebedeva and P.A. Nedotko write about this in their monograph "Vnedreniye izobreteniy v promyshlennosti SSSR" [The Introduction of Inventions in U.S. Industry] (Moscow, Nauka, 1984).

So-called small high tech or scientific research firms are at the center of these changes. In the book, which was prepared at the Institute of World Economics and International Relations of the USSR Academy of Sciences, an account is given of the role of small research business in the speeding up of the commercial realization of new products, the development of new production technologies, and the development of new forms of the cooperation and socialization of labor in scientific production processes. Of all the diversity of organizational forms, in which the participation of small research business in this work is realized, the authors examine five groups: small introducing firms which are established by inventors on loans of so-called venture (that is, involving a risk) capital; small firms which are organized for the implementation of scientific and technical achievements which were a secondary result of research and development; small firms of the sphere of service of goal program research and development; small creative groups or design brigades; specialists who individually come forth with ideas (inventions).

The interaction of small research business with big monopoly capital (the fourth chapter of the monograph is devoted to its description) is accomplished in two basic forms: the tradition form and a more complicated form--on the basis of the goal program financing of research and development. In case of the traditional system of relations introducing firms interact with large corporations most often at the final stage of industrial innovations, obtaining loans from them. The interaction of these firms with companies reduces mainly to credit and monetary operations (the corporation is the lender, the small firm is the recipient of loan capital). The authors note that the relations of creditor and debtor link the contractors much more closely than the relations of buyer and seller, which are typical of capitalist enterprise.

A more complex set of relations between small research business and large corporations is forming on the basis of the goal program financing of research and development. At the basis of each of the forms is the formation of special funds made up of monetary assets, which are pooled by several or even many industrial companies for the financial support of the innovative efforts of small research business. However, the venture capital funds are used for the issuing of loans to small research firms or the purchase of their stock, while the funds of the goal program type are spent as subsidies for special-purpose research projects and programs.

The differences in the forms of the use of assets--this idea is specially singled out in the monograph--lead to very important consequences. The venture capital funds, by issuing loans and purchasing stock, limit the

contacts of corporations only to small firms. In case of goal program financing all groups of small business are brought into the orbit of interaction with the monopolies. All the phases of the innovation process (from the determination of the goals and the formulation of the initial ideas to the commercial realization of the new product) are encompassed here. This increases substantially the effectiveness of scientific production processes, which are sped up noticeably. The possibility of breakthroughs in the decisive directions of scientific and technical progress is ensured. Not by chance do they believe in the United States that small firms are preparing and developing the material form of industrial production of the 21st century.

The organizational and economic mechanism of the functioning of the new forms of the cooperation of labor and the emergence of scientific production complexes, which correspond to them and make it possible to include in scientific research processes the immediate users of new science-intensive products, in the opinion of the authors of the book, are of substantial interest for the practice of building socialism.

We have analyzed only a few works which have been recently published: their authors preoccupied with the search for ways and means of intensifying scientific and technical development. The acceleration of scientific and technical progress is an objective law, which is attributable to the development of the scientific and technical revolution and the significant structural changes in the world economy. The improvement of the mechanism of the use of the achievements of science and advanced know-how is an urgent problem, the solution of which requires the improvement of the planning of scientific and technical progress and its management.

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INTRODUCTION OF RESULTS OF BASIC RESEARCH IN PRODUCTION

Moscow KHOZYAYSTVO I PRAVO in Russian No 2, Feb 86 pp 21-23

[Article by President of the Lithuanian SSR Academy of Sciences Yu. Pozhela, Hero of Socialist Labor, under the rubric "Greeting the 27th CPSU Congress": "Basic Science and Production"]

[Text] The intensification of the direct use in the national economy of the results of scientific research in the area of the basic sciences is a distinctive feature of the present stage of the scientific and technical revolution.

In the draft of the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000 it is stipulated: "To attach priority importance to the development of basic science, which predetermines the attainment by social production of a qualitatively higher level. To strengthen the technical orientation in the work of academic institutes. To enhance the role of sectorial and republic academies."

Today basic research is being conducted mainly by academic institutes and higher educational institutions of the country. The participation of basic science in scientific and technical progress is ensured mainly by the performance by institutes of work in accordance with economic contracts with industrial enterprises. The contact of science with production is being achieved by means of orders by industry to science. Purely basic research is being conducted mainly at the expense of the budget, moreover, the results of such research are frequently introduced with difficulty in production. Since academic organizations and organizations of higher educational institutions for their most part do not have a pilot production base, many basic developments, which are useful to practice, turn out not to be brought up to introduction. In our opinion, it is possible to distinguish four problems, the solution of which would play a decisive role in the matter of increasing the effectiveness of basic scientific research and speeding up its introduction in production.

These are, first, the streamlining of the financing of basic research and its supply with materials and equipment (at the expense of the production sphere). Second, the strengthening of the pilot production base of academic institutes. Third, the creation of reserves, which ensure the necessary freedom of

maneuvering and full partnership in case of the assimilation (the introduction in production) of new achievements of the basic sciences. Fourth, the organization of the interdepartmental cooperation of scientific and production organizations with different specialization in the introduction of the results of basic research.

Some experience in the organization of the efficient introduction of the results of basic scientific research in production has now already been gained. The solution of many problems was achieved in the process of implementing comprehensive goal programs. Experience in the matter of organizing the pilot production base of academic institutes also exists. The Institute of Electric Welding imeni Ye.O. Paton of the Ukrainian SSR Academy of Sciences is an excellent example. The cooperation of scientific research institutes and enterprises in a number of regions: engineering centers in the Ukraine, scientific production associations attached to the Belorussian SSR Council of Ministers, scientific production complexes and associations in Lithuania, also proved to be effective. The practice of establishing scientific production associations, which include the most important units that ensure scientific and technical progress: scientific research institutes, design organizations, and pilot works, has become firmly established in industry. But it is necessary to say that today a significant portion of the scientific forces of the country is not yet encompassed by the mentioned forms of cooperation. The achievements in the solution of important problems, which have been attained in many fields of science, need to be brought up to production. The process of integration along the entire front should be intensified by economic levels and be reinforced by the corresponding legal regulation.

What is needed for the regulation of the relations of basic science and production for the purpose of expediting the solution of the four problems mentioned above?

Academic scientific institutions and higher educational institutions should be granted the preference to place orders for equipment and materials in industrial ministries. For ministries the academic institutes and higher educational institutions, which conduct research in accordance with economic contracts (that is, in accordance with their orders), should become as if sectorial ones. The concern for the strengthening of the technological base of basic science, which corresponds to the basic specialization of the specific sector, should become a legally assigned duty of the latter. Legalized "guardianship," according to our forecasts, will increase drastically the effectiveness of the basic research being performed at higher educational institutions and the academies of sciences, which, in turn, will lead to the substantial acceleration of scientific and technical progress in the sector.

Small specialized enterprises, which operate under the scientific supervision of academic institutes and higher educational institutions, should be established. The experience of organizing such enterprises shows that they become the main links in the chain of the introduction of basic research in production, while also increasing at the same time the technological level of

scientific work. The active participation in their activity of staff members of the curator institutes is the main feature of these enterprises.

Such enterprises work for many sectors of the national economy. In practice these are interdepartmental enterprises. The organization of the proper material and technical supply is the main difficulty in their work. The products being produced by them are custom-made (not series-produced). Scarce materials and instruments are often needed in small quantities for their production. Moreover, it is frequently difficult to foresee in advanced what will be needed and when. And here the practice of the "acquisition" (without assets) of the necessary items: pieces of cable, radio components, integrated circuits, special metals, chemical reagents, microcomputers, and so on, is arising. The same situation is also observed at scientific institutions and higher educational institutions, since during the conducting of scientific research needs for various "trifles" often arise unexpectedly.

There is hardly an enterprise in the country, at which they do not deal with scientific associates or instructors of higher educational institutions--the "solicitors" of instruments, materials, and equipment. Unfortunately, in conformity with the legislation the buyer does not have the right to redistribute the products being allocated to him. Their issuing on the side is impossible, since Paragraph 88 of the Statute on Deliveries of Products interprets this as unfunded issuing with all the ensuing consequences. What remains to be done? It is necessary by hook or by crook "as an exception" to knock out products for experimental production. It seems that it is expedient that the USSR State Committee for Material and Technical Supply jointly with the USSR State Board of Arbitration would draft and approve Special Terms of the Delivery of Products for the Performance of Scientific Research Work. In this document it would be possible to settle clearly a large number of questions which concern the supply of industrial and scientific enterprises and organizations with extremely scarce products. The corresponding changes should also be made in the Statute on Deliveries of Products.

The organization of the interdepartmental cooperation of scientific research and similar institutions with industrial enterprises also requires the improvement of regulation. The organization of such cooperation in a number of regions under the supervision of local organs has yielded good results. For example, in Lithuania the Elektronika Scientific Production Complex was established 3 years ago. Two institutes of the Lithuanian SSR Academy of Sciences, two higher educational institutions, five departmental institutes, and seven enterprises belong to the scientific production complex. The cooperation of these organizations made it possible to develop automated instruments for the monitoring and control of technological processes during the production of televisions, various instruments for medical diagnosis, semiconductor devices for an automated system of the recording of electric power consumption, and computer-aided design systems of electronic equipment. The result is a significant scientific, technical, and economic impact.

However, the development of scientific production complexes is being checked by limitations in the freedom of the shifting of resources: it is necessary to take into account the fact that the majority of operations, which are performed within the framework of interdepartmental cooperation, are above-

plan, enterprising operations. For the development of cooperation the right of local organs of economic management to make additions, which are sound and have been submitted for approval to ministries, to the plans of operations (production) of the scientific research institutes and enterprises, which are located on the territory of the republic, if only within the range of up to 3 percent of the production and similar assignments, should be legalized. This will yield a large scientific and technical impact, since it will make it possible to organize cooperation with enterprises locally and to eliminate bureaucracy and red tape in the settlement of urgent questions of a scientific nature. The most difficult problems of the acceleration of scientific and technical progress by the implementation and introduction of basic achievements of science in production can be solved on the basis of the cooperation of academic institutes and the pilot bases of local enterprises. The adjustment of the plans of production and deliveries of a small number of enterprises will depend only on the vital need of the national economy of the country for the assimilation of new equipment and technology.

Temporary collectives are an important tool of the optimization of interdepartmental cooperation. Such a collective for the solution of the problems, which are connected with the development of a waste-free electroplating process at one of the enterprises, is operating in Lithuania. Temporary collectives, as is known, are set up, in particular, upon the representation of the council of ministers of the union republic by a decision of the State Committee for Science and Technology. In our opinion, the practice of establishing temporary collectives should be developed, having permitted the establishment on the initiative of the republic academies of sciences at enterprises and scientific research institutes of temporary scientific production collectives for a period of up to 2 years (for the accomplishment of specific tasks).

The combining of jobs for the period of the fulfillment of the assignment should be permitted in such collectives. By using temporary collectives locally, sectorial scientific research institutes will be able to enlist for the performance of specific jobs on projects specialists of basic science and higher educational institutions, while the latter will be able to enlist workers of enterprises, organizations, and individual ministries and departments for participation in basic scientific research. Such a form of cooperation of science and production is a requirement of today and a dictate of the times.

The time has come to take effective steps on the significant improvement of the use of the scientific potential and to increase substantially the amount of research and development being performed, while striving at the same time for a sharp increase of their national economic return. In combination with other steps this will help to ensure the accomplishment of a key political and economic task--to accelerate scientific and technical progress in every possible way.

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FACILITIES AND MANPOWER

MARCHUK ON ORGANIZATION, FINANCING OF INTERBRANCH COMPLEXES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Sep 86 pp 1-2

[Interview with Deputy Chairman of the USSR Council of Ministers and Chairman of the USSR State Committee for Science and Technology Academician G. Marchuk, by A. Lepikhov: "Interbranch Cooperation"; date, place, and occasion not given; first three paragraphs are SOTSIALISTICHESKAYA INDUSTRIYA introduction; abridged; full interview published in NTR: PROBLEMY I RESHENIYA, No 17, 1986]

[Text] Interbranch scientific technical complexes (MNTK) have been established in our country. They are a new economic organizational form of the cooperation of science and production and the concentration of scientific forces and material, technical, and financial resources for the solution of important scientific and technical problems and the development and assimilation of fundamentally new types of equipment and technology.

The task to attain in the shortest time leading levels in the world in the priority directions of science and technology and to achieve the shortening by many fold of the cycle from scientific research to the practical introduction of its results in the national economy has been posed for the interbranch complexes. The model statute on the complexes, which was recently adopted by the USSR Council of Ministers, is called upon to ensure the accomplishment of this task.

Deputy Chairman of the USSR Council of Ministers and Chairman of the USSR State Committee for Science and Technology Academician G. Marchuk tells about the interbranch scientific technical complexes and about the peculiarities of their organization and financing.

[Answer] It is probably possible, without being afraid of being mistaken, to say that our age is an age of more and more narrow specialization. At any rate practically everything that was developed in the first half of the 20th century is the results of the labor of talented, educated narrow specialists who know their work splendidly. The figures of the encyclopedists, who embrace with their thinking if not all the science contemporary to them, then extensive spheres of knowledge, have become the property of history.

But nature is unified and complex. We know this truth well. In recent decades the most significant breakthroughs in the sphere of new knowledge have been made, as a rule, at the meeting point of various fields of science. The birth of biochemistry and biophysics, chemical physics and molecular biology, physical chemical mechanics and information science is a visible expression of the objective regularity of such a process. Methods of research and equipment, which was developed by physicists, are being used most extensively in modern chemistry, biologists are equipped with all the power of the modern body of mathematics and the unlimited possibilities of electronic computer technology, while specialists in information science are pondering over the use of biological media in the storage and processing of information.

It is quite natural that the use in practice of the results of research in such fields of basic knowledge or ones similar to them no longer fits within the framework of the traditional sectorial organization of industry and is coming up against certain organizational difficulties.

In order to overcome them and to make a wide road for the latest directions of technology and the most advanced technologies, which by their nature are intersectorial and, if we are to be entirely exact, multisectorial, the first 18 interbranch scientific technical complexes (MNTK) were also established in the Soviet Union.

[Question] Interbranch scientific technical complexes are a new form for our country of the integration of science and production. Is there probably also much that is new in the purely organizational area?

[Answer] Of course. I will begin with the fact that the interaction of all the "links" of such complexes is of a mandatory, directive nature. The list of organizations of various ministries and departments, which belong to the complexes, is approved directly by the USSR Council of Ministers. Further. The main organization of the interbranch scientific technical complex--it is a powerful scientific research institute--acts with respect to the organizations and institutions, which belong to the complex, as the superior organ with all the rights and duties which follow from such a status. The work of all the institutes, design bureaus, pilot works, and plants is performed in accordance with a unified plan.

There is another important peculiarity of the interbranch scientific technical complexes. Their role is not limited only to the development of highly efficient types of equipment, technology, and materials. A mandatory component of the activity of the interbranch complexes is the promotion of the large-scale "duplication" of their achievements. For this purpose the interbranch scientific technical complexes submit to the planning organs of the country proposals on the series assimilation of developed innovations, give ministries and departments assistance in their highly efficient use, and can establish for this on their staff special engineering centers. Here once again the "torch" of mass introduction, that is, the list of plants, enterprises, and production associations, is approved by the USSR State Planning Committee.

[Question] What are the basic tasks which face the interbranch complexes?

[Answer] First of all the interbranch scientific technical complexes are the main organizations in the country for the accomplishment of the scientific and technical tasks which have been assigned to them. This means that they perform both basic and applied research and experimental design and technological operations, produce prototypes, and "bring" them up jointly with ministries and departments to series production. Moreover, the elaboration of proposals for the drafts of state five-year plans on the development in the country of the corresponding directions of science and technology is a duty of the interbranch scientific technical complexes. In its field each complex determines the prospects of its development and the achievement in the shortest possible time of practical results which are not inferior to the world level. Another sphere of activity of the interbranch scientific technical complexes is the preparation of drafts of scientific and technical programs on the most important national economic problems, as well as five-year and annual plans of the conducting of research, development, and experimental operations.

The interbranch scientific technical complexes were established, as you know, for the practical assimilation of the latest achievements of the basic sciences. For the present we do not have enough specialists here. So that the interbranch scientific technical complexes jointly with the corresponding ministries and departments will also engage in the improvement of the skills of personnel. Moreover, they have been given the right to come forth with proposals on the organization at higher and secondary specialized institutions of the training of students in the new specialties they need.

I will add that the development of information banks, automated ones, of course, which will reflect the latest achievements of domestic and world science and technology, as well as the organization of the information supply of all interested organizations and enterprises are also being placed on the shoulders of the interbranch complexes.

And, of course, in speaking about the interbranch scientific technical complexes, one must not forget that precisely they are conducting and coordinating the research and development being performed in the country in accordance with the corresponding assignments of the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries to 2000.

Back in December of last year 7 interbranch scientific technical complexes began to perform the functions of the main organizations for 11 problems of 4 priority directions of this program. While just recently, in July of this year, the USSR Council of Ministers made the decision to extend to all the other complexes as well the right granted to the main organizations to establish direct scientific, technical, and production relations with the corresponding organizations and enterprises of the CEMA member countries. Such a decision, unquestionably, will make it possible to increase the effectiveness of the scientific and technical cooperation of the countries of the socialist community.

[Question] Could you tell me about the peculiarities of the management of the interbranch scientific technical complexes?

[Answer] A general director, who is appointed by the USSR Council of Ministers, is in charge of each of them. As a rule, the manager of the main organization of this complex becomes the general director.

For the settlement of the most important scientific, technical, and economic questions of the activity of the interbranch complexes a council is set up in each of them. Its decisions are mandatory for all the organizations and enterprises, which belong to the complexes, as well as are taking part in its work.

Now about the planning activity of the complex. The drafts of the scientific and technical programs on the most important national economic problems and of the unified five-year and annual plans of the conducting of research, development, and pilot production operations and the distribution among the performing organizations of resources and the amounts of capital investments are the task of the main organization of each interbranch complex. These drafts, which have been approved by the corresponding ministries and departments, are submitted to the USSR State Committee for Science and Technology.

It is stipulated by the decree of the USSR Council of Ministers, which was adopted in late July of this year, that the assignments on the basic indicators of the activity of the interbranch complexes and on the production of the new types of equipment, technology, and materials, which have been developed in the interbranch scientific technical complexes, starting in 1987 will be included by the State Planning Committee of the country in the drafts of the state plans of USSR economic and social development.

[Question] Are there any peculiarities in the material and technical support of the activity of the interbranch scientific technical complexes?

[Answer] Yes, there are. I will dwell only on the main ones. First of all the orders of the complexes for material and technical resources are met in a priority manner and in the full amount. Moreover, the managers of scientific research institutes are well aware that you will not provide for everything necessary, no matter how you try, in the draft of the plan--scientific research does not lend itself to 100-percent regulation. And they can tell you with what troubles it is necessary to achieve the allocation of an unplanned instrument or equipment. It is a matter here, as a rule, not of someone's conservatism--the available resources have already been distributed. So that with respect to the interbranch scientific technical complexes the State Committee for Material and Technical Supply of the country, ministries, and departments are obliged to settle promptly the questions of the additional allocation to them of material and technical resources, the need for which arose already during the fulfillment of the established assignments. In necessary cases the USSR State Committee for Science and Technology earmarks for the interbranch complexes additional financial and manpower resources from the reserve which is at its disposal.

There is another important situation. We have been saying for a long time now that many developments for years cannot get a start in life due to the

weakness of the experimental base. So that the capacity of the pilot production and experimental base that is being developed, once again in a priority manner, should ensure the checking of the results of the research and development of the interbranch complexes in a period which does not exceed 1 year.

I will add that for the organizations and enterprises, which belong to the interbranch scientific technical complexes, there is an additional benefit: they are being provided in a priority manner with the rental of units, instruments, and equipment for scientific research.

[Question] How is the economic activity of the interbranch scientific technical complexes being organized?

[Answer] I will dwell on only a few aspects of it. In the interbranch scientific technical complexes there have been set up, for example, a number of centralized funds. One of them is the bonus fund. It is formed from two sources. One is a portion of the assets of the interested ministries and departments, which are turned over by them from the corresponding centralized bonus funds. The second source is a portion of the assets of the material incentive funds of the organizations and enterprises, which belong to the complex, as well as are taking part in its work. Of course, such "alienation" of a portion of the material incentive funds can be carried out only with the consent of the corresponding labor collectives.

It is vitally important that the workers of the complexes will receive bonuses not for the fulfillment of some intermediate stages of the work or others, but for the development, assimilation, and introduction of new equipment.

And since we are speaking about the development within the interbranch scientific technical complexes of truly new equipment that is competitive on the world market, it is stipulated that a centralized fund of currency receipts is created here. It will be replenished by means of deductions from the assets, which are received by the organizations and enterprises of the interbranch complexes and the ones participating in their work, for the sale of their scientific and technical achievements--licenses and know-how, as well as the output being produced. Another source of the replenishment of this fund is a portion of the currency receipts which have been obtained by outside organizations in case of the delivery for export of products which have been manufactured in accordance with designs of the interbranch scientific technical complexes. Incidentally, the problem, which has been discussed for a long time, of the material interest of the developers of products, which conform to the world level or exceed it, is solved in this way. The unused balances of the centralized funds of the interbranch scientific technical complexes, both the bonus and the currency funds, are carried over to the next year and are not liable to confiscation. Further. The managers of the organizations and enterprises, which belong to the complexes, have been given the right to hire scientists and engineering and technical personnel through the combining of jobs. The material interests of the developers of the interbranch scientific technical complexes, who engage only in scientific organizational activity, are also not restricted. Their salaries are

established in the same amounts as in the scientific research subdivisions. Moreover, the general director of the interbranch scientific technical complex has the right to increase the wage of the management personnel of the main organization, who do not have an academic degree. This is done within the limits of the established wage fund and only for the performance of functions on the support of the activity of the complex as a whole.

The wage of the staff members of the engineering centers, which are carried on an independent balance sheet, is also equated with the wage that is envisaged for the corresponding categories of workers of the scientific research institutions, design and technological organizations, and pilot (experimental) enterprises.

[Question] Are there complication and difficulties in the way of the organization of the interbranch complexes?

[Answer] Difficulties, of course, exist. The decree on the establishment of the interbranch scientific technical complexes was adopted in December of last year, when, as you realize, the majority of items of the 12th Five-Year Plan had already been submitted for approval to many tens of ministries and departments.

A large part of what I spoke about to you above, when describing the life of the interbranch scientific technical complexes, follows from the model statute on the complexes, which was approved by the USSR Council of Ministers in late July 1986. This model statute, of course, needs a specific interpretation for each of the complexes. There cannot be any average, standard approach here--the diversity of the problems, which are being worked on within the interbranch scientific technical complexes, is too great.

However, the fundamental problems of organizing the life of the interbranch scientific technical complexes, of course, are already clear today. They will be able to operate properly, if we are able to observe strictly the spirit and letter of the drafted Model Statute on Interbranch Scientific Technical Complexes. Namely: we will actually provide the favorable economic climate which is needed for their operation, will set up the supply of all the necessary material and technical resources, will learn to react promptly to their needs, will properly form creative collectives of researchers, engineers, and workers, and will establish close contacts both with the collectives of academic institutions and with industry. Moreover, these should be the contacts, which are supported not by the enthusiasm of individual persons (although it, of course, is necessary), but on the basis of mutual economic interest. The interbranch complexes were established less than a year ago. We hope, by relying on the interbranch scientific technical complexes and, of course, by adopting the achievements of academic science and sectorial ministries, to make full use of the advantages of the planned system of management for rapid progress in the direction which was outlined by the decisions of the 27th CPSU Congress.

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SHATURA TECHNOLOGICAL LASER CENTER

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 5, 4-17 Mar 86 p 2

[Article by A. Mikhaylov under the rubric "The Pulse of the Scientific and Technical Revolution. NTR-TASS": "The Generating Beam"; first two paragraphs are NTR: PROBLEMY I RESHENIYA introduction]

[Text] The festive opening of the scientific experimental and production engineering base of the Scientific Research Center for Technological Lasers of the USSR Academy of Sciences was held in Shatura on 21 February 1986, on the eve of the 27th CPSU Congress.

Scientific laboratories and experimental testing units, an engineering and design section, and a pilot works are a part of the center. The development of laser thermal and atomic molecular technological processes, laser methods, and systems for their application in medicine, biology, environmental protection, and other fields is already in full swing.

The elegant buildings of the laser center, which are located in a pine forest on the shore of a lake, are an example of the architecture of a modern scientific and technical complex.

Speaking at the opening of the center, Vice President of the USSR Academy of Sciences Academician Ye.P. Velikhov said:

"The establishment of a new production base in our country is impossible without the development of new technologies. Laser technology is one of the key ones. Light, owing to the special properties of coherent laser radiation, is already beginning to replace conventional methods of machining materials and is affording us completely new opportunities, which previously simply did not exist.

"Two important tasks now face the staff members of the center. The first is to provide the national economy as quickly as possible with reliable technological lasers, which it is hoping for very much. And here development and production should not lag either behind the increasing needs of the country for laser equipment or behind the march of world scientific and technical progress. In this the ability of the staff members of the center to work with scientific collectives of academic institutes, the ability to grasp

their ideas, as well as close contacts with industry will be of enormous importance. Having set up the production of laser unit during this five-year plan, we should prepare the exponential growth of our entire laser industry.

"The uniting of the efforts of the states of the socialist community on the development of laser technology is spoken about in the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries to 2000. The laser center is at the same time also the main organization of the Technological Lasers Interbranch Scientific Technical Complex, to which a number of plants, scientific institutions, and design organizations of the USSR Ministry of the Electrical Equipment Industry already belong. The fulfillment of assignments of the Comprehensive Program also constitutes a significant portion of the work of this interbranch scientific technical complex. The GDR, Bulgaria, and other socialist countries are already cooperating successfully with organizations of the complex.

"The opening of the center coincides with a prominent event in the history of the Soviet state--the beginning of the work of the 27th CPSU Congress. It is necessary that your collective would always move with a sense of the greatest responsibility along the road of the development of the laser industry in the Soviet Union."

Laser units, which were developed of physicists, designers, process engineers, and workers, have begun to operate in the building of the scientific subdivisions of the center. The laser beam has begun to work in the technological processes of welding, cutting, hard facing, and the surface heat treatment of various materials. Of course, a certain period of its establishment, during which staff members of the center already carried out a number of important studies and developments, preceded the festive opening of the center.

Laser technology is being successfully introduced at the AvtoZIL Production Association. With its aid the thermal hardening of the cylinder block head has been set up here.

A series of operations on the study of a wide range of phenomena which occur in gaseous media when exposed to infrared laser radiation was performed at the laser center in collaboration with the Institute of Spectroscopy of the USSR Academy of Sciences, the Physics Faculty of Moscow State University, and the Institute of Atomic Energy imeni I.V. Kurchatov. The interest of scientists precisely in gases is natural: they are the basic working material of modern laser chemical technology, which makes it possible to synthesize new classes of substances, to accelerate the course of reactions, and to separate rare expensive isotopes.

Staff members of the laser center developed for the first time in the country laser spectrometers with a computer system for the gathering and processing of information.

Last year an educational center for information science and computer technology was established. Two offices of information science are now in operation--one directly at the laser center, the other at Shatura Secondary

School No 4. They are equipped with advanced personal computers, while young scientific associates teach there. Along with planned lessons, group lessons for school children starting with the 6th grade are also being conducted at the educational center.

Several types of industrial technological lasers have been produced and are being experimentally developed at the laser center.

At present carbon dioxide lasers make up a significant portion of the production volume. The production volumes of ion lasers, which are finding basic application in medicine, are also large. It is presumed that the existing ratio of the production volumes of these types of lasers will be maintained until 1992. But at the same time in the next few years the production of semiconductor lasers will increase rapidly.

These three types of laser equipment should also constitute the basic field of activity of the forming interbranch complex.

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NOVOCHEKASSK POLYTECHNICAL INSTITUTE

Moscow PRAVDA in Russian 21 Apr 86 p 3

[Article by Doctor of Technical Sciences Professor V. Shukshunov, rector of Novocherkassk Polytechnical Institute and a delegate of the 27th CPSU Congress: "The City of Students. Education--Science--Production"]

[Text] I often ponder: Why did the mushrooming of the number of higher educational institutions, especially technical higher educational institutions, accompany the sharp decline of the prestige of engineering occupations, intensifying this process? Without having highly skilled scientific personnel and the necessary material base, many of these higher educational institutions are dragging out a miserable existence, training very mediocre specialists. But how impressive the statistics appear, but how we are able to astonish with a figure, saying that at our higher educational institutions they are training more specialists than in so many countries taken together. Who needs this? Is this not the very sample of idle talk and ostentation, which the party is now combating especially vigorously?

But the present higher educational institution, which has a great scientific potential and longstanding and good traditions, is a center of spiritual wealth, its beneficial influence on the city, in which it is located, is enormous, the interrelations are diverse. I will try to clarify this idea on the basis of the example of our institute.

From time immemorial Novocherkassk has been called a city of students. Recall Mayakovskiy: "In a new way the streets of Novocherkassk are black today--from students of higher educational institutions...." In 1926 Vladimir Mayakovskiy also visited our institute and addressed the students. Novocherkassk Polytechnical Institute imeni Sergo Ordzhonikidze, which is the oldest on the Don (it was founded in 1907), is a city within a city, its population is about 30,000. The institute has affiliates in Shakhty and Volgodonsk. It is one of the largest in the RSFSR.

I remember with what a mixed sense of delight, astonishment, and timidity I saw Novocherkassk Polytechnical Institute, having come here to study from Krasnodon. Ulitsa Prosveshcheniya, which wallows in greenery, suddenly brought me to a magnificent architectural ensemble made up of several palacelike buildings, which had been executed in the style of classicism and

which looked especially impressive in the midst of the development of the Kazakh city in accordance with different plans. The educational buildings are harmoniously combined with an entire complex of sports facilities, which are located on the grounds of an ancient park with mighty century-old oak trees, maple trees, ash trees.... Having entered the main building, I froze, astonished by the appearance of the Covered Courtyard. Yes, this is a genuine temple of science, on the threshold of which one wants to and needs to take off his hat. And a temple not only in appearance.

Novocherkassk Polytechnical Institute is rich in glorious traditions. The first projects of M.L. Mil and V.M. Glushkov originated here. Among the graduates there are 19 academicians and 11 corresponding members, 17 Lenin Prize winners, 24 Heroes of Socialist Labor, and 27 honored figures of science and technology of the republic.

And there is another very important, in my opinion, detail which is probably characteristic of the large higher educational institution: writers, artists, poets, and actors came "in passing" from Novocherkassk Polytechnical Institute. It is a pity that there is no such machine, by means of which it would be possible to determine the enormous benefit, which our library, probably one of the largest in the RSFSR, is bringing both the institute and the city. Its collection is millions of editions, the library acquires annually about 170,000 books and journals.

What about what else is "secondary"? Of course, physical culture and sports! You will see simply everyone at the institute's swimming pool, the only one in the city: preschoolers and pupils, young people and people of a very honorable age. In the city they simply say: "Our pool," although, when the time comes for repair, it turns out that the pool is nevertheless the institute's. While at the stadium (how successfully it was located in a half-circle of educational buildings) institute, city, and even all-union matches are held.

At Novocherkassk Polytechnical Institute there are thousands of skilled sportsmen and about 8,000 wearers of the badge Ready for Labor and Defense. There are "home-grown" stars in many types of sports. Soccer? The team of Novocherkassk Polytechnical Institute is a repeated champion among the higher educational institutions of the country. Heavy athletics? Vasiliy Alekseyev is a repeated world champion. Chess? Igor Bondarevskiy is a grand master. And our amateur artistic work?...

Stop! I hear the bored voice of a morose person who is buttoned up: "A singing professor--this is not respectable. People are busying themselves not with their own job."

Their own, very much of their own! Students adore such people. Any genuine instructor, especially a professor, should be first of all an individual, otherwise he is simply a hack, a mechanical transmitter of information--and nothing more. For it is well known that it is important not only what they teach, but who teaches and how. Each of us remembers the educators of the secondary and higher school, who left a deep print in his soul.

However, I again hear the same voice: "The rector of a technical higher educational institution concerning art and literature, physical culture and sports.... Let him talk about this somewhere at the end of the article, in passing, casually. But what about personnel and scientific work, what about assistance to the city in this respect?"

Most likely these are our everyday concerns. Yes, to train a knowledgeable and thinking engineer is a very serious and very difficult task. But all the same the main thing is to educate a son, and not a stepson of the homeland, whose moral health and civic qualities determine in the final analysis the attitude toward the cause which he serves.

It is necessary to state frankly that we perform ideological and educational work (I would generally call it spiritual work) often indifferently, manipulating in a customary and persistent manner dogmas, stillborn schemes, and general slogans. We glibly report how many lectures on ideological and moral themes were given--and not a word on what influence they had on the minds of the students.

Novocherkassk Polytechnical Institute annually gives the country about 3,000 young specialists. Of course, our graduates work at all the enterprises of Novocherkassk, which have if only something to do with the specialization of the institute. Several have become public figures. And it is of inestimable importance that they are maintaining the spiritual tone of our city and are the bearers of technical culture.

Unfortunately, the use of engineering personnel and, honestly speaking, the level of their training leave much to be desired. For example, at the Novocherkassk Electric Locomotive Building Plant the lot of many specialists is office or economic work and patronage assistance to the countryside. This is our common all-union misfortune, and you will not help the matter here with conversations, the immediate reorganization of the higher school is necessary.

Stagnant phenomena, bureaucracy, a whirlwind of documents, the passion for gross quantitative indicators, the excessive formalization of the educational and scientific process, and scholasticism came into sharp conflict with the creative element at higher educational institutions and struck a serious blow to practical work.

Perhaps, I have deviated somewhat from the theme of the article, but this is an unbearable thing.

And further concerning personnel. The beneficial changes, which have occurred in the country, enabled us to engage in the large-scale advanced training of personnel of the city and, in part, of the oblast. This work is difficult, but extremely necessary, for the gap between the present level of science and technology and the level of knowledge (even of engineering and technical personnel!) is now exceptionally deep. A person, without knowing new equipment, to put it bluntly, fears it. We are conducting training from top to bottom--from economic and technical managers of enterprises, from party, soviet, trade union, and Komsomol workers to foremen, brigade leaders, and workers. In a year 1,200 people will undergo training.

Such advanced training was begun on the initiative of the Novocherkassk City Party Committee soon after the June (1985) conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress. Its first stage pursues the goal to ensure the psychological preparation of personnel for the radical reorganization of work and to overcome the fear of science-intensive equipment and technology by studying its principles. The second stage ensures the in-depth training of personnel and is of a more practical nature. In addition to the theoretical lessons, which leading scientists of Novocherkassk Polytechnical Institute conduct, the students learn to work independently at a computer console and display, to control NC machine tools, the plant technical management automation system, and the computer-aided design system, perform independent assignments, and take tests. Affiliates of the center of the training and advanced training of personnel have been established at tekhnikums of the city. The first graduation will be in June.

The collective of the institute is experiencing a profound sense of satisfaction with the fact that it quickly found its place in the solution of the problems of the acceleration of scientific and technical progress. All this is good, but the large-scale work on the advanced training of personnel, which should become permanent and should become more and more complex, cannot be performed only as a voluntary service. It is necessary to establish at large higher educational institutions, which long ago became not only educational institutions, but also powerful educational scientific production complexes, regular, permanent educational and scientific centers of the training and advanced training of personnel of the most different categories. The higher educational institutions, which have a mighty scientific potential, a well-organized method of instruction, and material base, are called upon to play a decisive role in this.

Further, about something that became unbearable long ago, our science and its contact with production, the mechanism of the introduction of scientific developments.

Novocherkassk Polytechnical Institute is about 800 doctors and candidates of sciences, thousands of specialists (theorists, designers, process engineers, and others), it is 3 powerful engineering and science centers with pilot works. Such centers implement very successfully the entire cycle--from the idea to the machine.

How are these impressive forces being used in the interests of city enterprises? We have long-term relations with large plants. Jointly with the All-Union Scientific Research, Planning, Design, and Technological Institute of Electric Locomotive Building, which is located in Novocherkassk, we are carrying out the elaboration of the problems of high-speed ground transport. The progress of the fulfillment of the "Process Engineer" Comprehensive Goal Program, which is in effect on the basis of joint orders of the Ministry of Higher and Secondary Specialized Education and the Ministry of the Electrical Equipment Industry, was recently discussed at a joint meeting of the party committee of the electric locomotive building plant and Novocherkassk Polytechnical Institute. The work is proceeding satisfactorily. Affiliates

of chairs of the institute have been established at several enterprises. The council of the "Novocherkassk Polytechnical Institute for the City" Program is coordinating all the work in this direction. The times, when they forced scientists of higher educational institutions "to invent" a power nut driver, have passed, but we have not yet completely gotten rid of work on minor themes, although the history of the development of science convincingly shows that revolutionary changes in equipment and production are achieved precisely on the basis of basic research. Let us face it, for a certain portion of the unconscientious scientists (and it is not that small) minor economic contracts have turned into a convenient feeding trough, next to which one can live well, contentedly, and quietly. Such scientists with the psychology of handicraftsmen get off with very simple recommendations, but not serious scientific research, a special form of idleness--the simulation of tireless activity--is current among them. A power nut driver? Do not mention it. A bicycle? They will invent a bicycle with pleasure--it is easier that way. They cling with an iron grip to their guaranteed 300-500 rubles. Although with considerable difficulty, at the institute we are also gradually getting rid of loafers in science.

Our research for the needs of enterprises of the city in essence is comparatively little. Here a number of questions are also arising.

Why should we seek "employers" on the side 1,000, or else thousands of kilometers away, where, as they say, the heifer is a quarter kopeck, and transportation is a ruble? For example, Novocherkassk Polytechnical Institute took part in the development (for the first time in the country) of a system for the monitoring of the surface waters of the basin of the Moscow River, although two rivers flow next to Novocherkassk, while the Don is a stone's throw away. Is it really possible to assume that the capital is lacking in science?

But are there, perhaps, in our home town still too few objects for the exertion of efforts? By no means. Here there is a rich diversity of the most different sectors of the national economy: an electric locomotive building and machine tool building plants, a petroleum machine building plant, a chemical plant, the Magnit Production Association, a state regional electric power plant, the Giproelektro, and other enterprises, which have a direct bearing on the scientific interests of Novocherkassk Polytechnical Institute.

Have our economic managers and the main specialists of enterprises, perhaps, stagnated so, that they will not accept what is new? I know them all well--there are no conservatives among them.

It is a reasonable question: How does the cooperation of science with production on the side turn out well for our institute? It is very simple: our immediate clients are ministries, which "can do everything," without being bound by countless multitudes of instructions, restrictions, and prohibitions. It is for this reason, and first of all for this reason, that the institute is participating in 18 union, regional, and republic scientific and technical comprehensive goal programs and is in charge of 6 such programs.

Here we have come to the most urgent problem of the introduction of scientific developments in production, with which, of course, not only Novocherkassk is "ill." So much has been said about this problem that it has already become the talk of the town. This theme is also not disappearing from the pages of central newspapers, but (is it not strange?) the state of affairs, although it has changed a little for the better, has changed painfully, just barely.

According to the data of the USSR State Committee for Science and Technology, 80 percent of the new developments are being used at only one enterprise of the country.

What is the matter? The main thing is the lack of an efficient system of introduction. The notorious gross and a conservative mechanism of planning, which is based on the simplest quantitative indicators (rubles, kilometers, units, and so on), weigh heavily. Gross qualitative indicators, which are measured in rubles, and not physical qualitative indicators, are tearing science away from production. There is no doubt that after the 27th party congress this situation will change radically for the better.

The bitter truth is that in the past 10-20 years quite a few managers, who barely endure the plan, but are good at making promises and willingly support in words all kinds of initiatives and undertakings (and at times also originate them themselves in the quiet of their offices), in order subsequently to wreck them, have been formed in our country. Of course, such a manager, be it a scientist or production worker, will cling with an iron grip to instructions and will resist what is new in every way. Fortunately, in recent times such managers in our country have become fewer and fewer. The Novocherkassk City Party Committee is also resolutely getting rid of them.

Yes, during these years some of us became too deeply bogged down in routine. And if it is very necessary (and now it is precisely very necessary!), we can and know how to, and how we know how to. But if we can and know how to, we are obliged to do everything, literally everything that we can and know how to, and to do it according to the highest standards.

Under the incredibly difficult conditions of the Great Patriotic War the production of military equipment, which surpassed the fascist military equipment, was organized quickly (according to present standards, incredibly quickly). But at that time the developments, say, of aircraft designers went immediately to the shops of plants.

But what about today? Here is one of the large number of examples. Scientists of Novocherkassk Polytechnical Institute synthesized high-early-strength high-iron cement. Patents of the United States, the FRG, Japan, and Sweden have been obtained for this material and technology. A license passport has been drawn up. The economic impact is estimated in the millions of rubles. But this impact is on paper: there is no large-scale introduction. It is also possible not to doubt...that this scientific discovery of ours will be used promptly abroad. Here it is necessary at times to purchase abroad materials and equipment, which have been produced in accordance with our licenses.

It is not worth thinking, however, that the only thing we, the scientists of higher educational institutions, did during all these years was to criticize the existing system of the introduction of scientific developments in production. Having anticipated the times, we sought means of improving the mechanism of introduction and means of intensifying scientific labor.

At present much is being said about the scientific engineering centers which have begun to operate in the system of the Ukrainian SSR Academy of Sciences. Similar centers were established at Novocherkassk Polytechnical Institute about 10-15 years ago on the initiative of sectorial ministries. The centers turned the higher educational institution into an educational scientific production complex. They, having pilot works, reduced the time of introduction to a minimum. Any such center is much more useful and stronger than the many regrettably well-known sectorial institutions with the high-sounding name of scientific research institutes, on which to this day satirists sharpen their pens.

Such relations of ours with the city are good for the most part, but at times are even very complex. Of course, there are also other ones: the participation of students in all kinds of economic operations of the city, especially construction (and this is very necessary, important, and mutually beneficial), assistance in the implementation of the school reform, and concern for preschool institutions. Unfortunately, at times the assistance to the city is a consequence of dependence or bungling, when, for example, engineers and docents with a zeal, which is worthy of better use, sweep the streets and work at vegetable bases or a bakery. Yes, on this level the situation of Novocherkassk Polytechnical Institute is probably no worse than that of others....

In short, there are very many shortcomings and unsolved problems. But we are looking optimistically to the future, since now, after the 27th party congress, we have a clear and meaningful program of actions, since today's requirements of the party are affording extensive freedom for initiative, confidence, and hopes. After all, we have enormous possibilities, which it is necessary merely to use.

To know how to and to want to use.

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AUTOMATION AND INFORMATION POLICY

QUICKER ACCESS TO NEW SCIENTIFIC, TECHNICAL INFORMATION

Moscow TEKHNIKA I NAUKA in Russian No 1, Jan 86 pp 30-31

[Article by Candidate of Chemical Sciences S. Kara-Murza under the rubric "The Scientific and Technical Revolution: Social Aspects": "An Information Crisis: Yes or No"; first two paragraphs are TEKHNIKA I NAUKA introduction]

[Text] Scientific and technical information.... This theme is being raised with enviable regularity in the press, including in our journal. For example, 1984: TEKHNIKA I NAUKA, No 1--"Where to Swim in the Sea of Information," No 3--"Nonusers of Information," No 10--"The Scientific Survey Is a Stage of Development."

We are also commencing the first, New Year's issue of the journal with a selection of materials which will help the readers to find out more about the methods of work with scientific and technical information.

Scientific information is not only the basic product of the activity of the researcher, but also a most important resource of scientific work. Information activity is a special "cross-section" of it, and, in order to use it in full, it is necessary to improve the equipment and the organization of the entire system of the storage, processing, and distribution of this product of human thought. We will not examine future automated information retrieval systems. We will speak about the tools which today are accessible to practically all users.

The increase of the scale of science has led both to the overloading of traditional communications channels and to the excessive expenditure of the efforts which are channeled into the retrieval of the necessary information (a research chemist in the United States spends on this more than half of his working time). Therefore, the science of science of all countries has been asked the question: How are scientists and engineers to seek and how are they to use information?

It is necessary to note that this is a difficult, complex problem, the solution of which requires at times a new, nontrivial approach. By means of surveying, for example, it is even difficult to establish precisely which periodicals scientists read, since it is considered improper not to read authoritative specialized journals. An example? By all means. Sociologists

of the United States distributed a list of publications with the request to note the ones which are read and included in this list several nonexistent journals with a respectable title. A large portion of the scientists, who filled out this list, noted: they regularly read one or several such mythical journals.

The bulk of scientific information, especially new information, all the same is retained in the brain of millions of scientists and engineers. We know little about the mechanism of the functioning of this nonformalized repository. The main channel here is personal contacts, at times they make it possible to obtain valuable scientific information 2-3 years before it appears in the literature. At times this has to do with research which has not yet been completed. Such information in general is rarely published. But meanwhile every result "worthy of publication" is achieved at the cost of many failures, incorrect hypotheses, and procedural errors, and, of course, it is useful for other scientists and engineers to know about it. Moreover, this communications channel has feedback (it does not exist in case of work with literature). Personal contacts turn into an intensive creative process between the "user" of the information and its "source." The combination of such information channels as personal contacts and scientific literature is an example of synergism--in the sense that the efficiency of their combined use greatly exceeds the effectiveness of the use of each one separately.

Scientific literature, of course, is the most important of the formalized channels of information exchange. The rule: research is not considered completed until the result has been published, has existed from time immemorial in science. Specialized journals are published precisely for this. They simultaneously both are an archive of science and perform a purely social role: publication strengthens the prestige of a researcher. Publication is a criterion of the evaluation of the work of a scientist, and he strives to publish as many articles as possible (American scientists even have an aphorism: "Publish or perish!"). As a result a kind of glutting is occurring. It became one of the sources of the information crisis. At the beginning of the past century there were about 100 scientific journals, now there are about 100,000 scientific and technical periodicals. The necessary information is being lost in the flow of unnecessary information. It is becoming more and more difficult to find the necessary information. Publishing houses are forcing authors to decrease the size of articles and the number of illustrations, often to the detriment of the information value. And all the same manuscripts wait an intolerably long time for publication, and the information, in the final analysis, becomes obsolete. Libraries are being filled up with journals and books, many of which are not requested by anyone. A paradoxical situation is arising: an abundance of scientific data, which it is practically impossible to obtain, in other words, an "information famine" under the conditions of "supersaturation."

And still we cannot agree with the opinion of outstanding English physicist John Bernal: "the scientific journal in practice has been killed by the growth rate of science," if only because quite efficient information retrieval tools have now been developed. They are based on the use of computer hardware and make it possible to decrease drastically the expenditures of efforts on

the obtaining of publications--both from the "repository" and from the front line of science. This is the first thing.

Second, journals, in which short articles containing scientific and technical information are published quickly, with minimal editorial processing (or even without it), have appeared owing to modern duplicating equipment.

Finally, scientists themselves have turned to the most ancient method--the direct exchange of letters. But already on the basis of new equipment. Duplicators make it possible to send copies to very many colleagues, in whose opinion the author is interested. Such letters are called preprints, since they contain, as a rule, information which is to be published later.

Preprints are rapid information which presumes feedback. They are not subject to editorial restrictions (for example, size, form), and just as in case of personal contacts there is room here for discussion of errors and failures and of procedural techniques and for disputable things. Even kinds of international "postal departments"--centers for the exchange of preprints--exist.

Thus, the user of information does not need to purchase a relatively expensive journal, in which many articles are of little interest to him. Moreover, the necessary information, say, for a chemist, is dispersed: 25 percent in 50 journals, 60 percent in 500 journal publications, and so on. Even large libraries cannot purchase this entire set. But each researcher usually uses only two or three libraries, and he will hardly seek information at other places. But the scientist, who has mastered well this information channel--preprints--can even select his own special library from the reprints of articles, which were received directly from the authors. In the United States, for example, 60 percent of the biologists send out more than 100 reprints for each article of theirs (among chemists 14 percent do).

The exchange of preprints.... It also became possible because journal literature is now provided with a very simple and easily understood retrieval tool--weekly "current tables of contents." These are six issues (by fields of sciences), in reality a small journal, in which the tables of contents of the issues of scientific journals, which have been prepared for publication, are reproduced. Such a "current table of contents" is provided with a permutation subject index and, which is the most important thing, the addresses of the authors of the articles. After examining the "table of contents," the researcher can request a reprint of an article at the moment of its publication (and at times also earlier). "Current tables of contents" are distributed annually in the world in the quantity of 50,000 sets, and 85 percent of the researchers request reprints of publications.

And this is not only a kind of "radar" which makes it possible to glance over regularly and quickly the front line of journal literature. It is also a stimulus of creative activity. Scientists themselves testify: each issue of the "tables of contents" arouses in them unexpected associations and ideas, which influence substantially the progress of research.

A very interesting "spontaneous" experiment testifies to the effectiveness of publications of this sort. One of the authors published an article on a modified method of analyzing protein. When drawing up the "current table of contents" the address of the author was given incorrectly. Here is the result: 375 requests for a reprint came to the address indicated in the article and 2,125 came to the address indicated in the "table of contents."

In addition to "current tables of contents" (with the aid of computers) quite a large amount of index literature (annotated, bibliographic, and other publications) on individual subjects and narrow fields of research is being published. These indices, along with catalogs, card files, and so forth, are published in various countries (or by international organizations); together they constitute a set of retrieval tools which enable the researcher to have a broad idea of the front of information being published in the world.

"Ukazatel bibliograficheskikh ssylok" [The Index of Bibliographic References] has become the most important information retrieval tool of the new type.

The index is based on the traditional norm: when publishing a text on the results of his work, a scientist should cite the works of his predecessors.

This, in turn, increases the amount of information which is contained in an article. For each scientific direction begins with one or two works and spreads like a tree of ideas and developments.

But everything will be brought to naught in the absence of the ability and desire of researchers to use advanced retrieval tools. Conservatism is strong: many people prefer to use means which are ineffective, but have been known from their undergraduate days. The proverb says: "You can lead a horse to water, but you cannot make him drink."

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PATENTS AND INVENTIONS

INCREASE OF EFFICIENCY OF INVENTING ACTIVITY

Moscow MOSKOVSKAYA PRAVDA in Russian 9 Feb 86 p 2

[Interview with First Deputy Chairman of the USSR State Committee for Inventions and Discoveries L.Ye. Komarov, by MOSKOVSKAYA PRAVDA science commentator Professor L. Sorin under the rubric "Scientific and Technical Progress": "The Invention at the 'Crossroad"'; date, place, and occasion not given; first paragraph is MOSKOVSKAYA PRAVDA introduction; capitalized passages published in boldface]

[Text] "While devoting paramount attention to the strengthening of large scientific and technical organizations, at the same time it is necessary to actively support the work of inventors and efficiency experts..." it was noted at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress. We asked L.Ye. Komarov, first deputy chairman of the USSR State Committee for Inventions and Discoveries, to tell about how this instruction is being implemented, about the problems of improving the work on the use in the national economy of significant technical suggestions, and about the means of their solution in light of the precongress documents of the CPSU Central Committee.

[Answer] The importance of inventing activity in the solution of the problems of scientific and technical progress and, hence, in the acceleration of the socioeconomic development of the country is well known. In the past 6 years about 50,000 inventions have been registered in the country. This surpasses quantitatively the indicators of the industrially developed countries.

As to the questions connected with the use of inventions, the urgency and activity of their discussion not only are not decreasing, but rather are constantly increasing. It is possible to judge this if only from the statements of the press, which is publishing pointed materials of a critical nature, which are based on facts. As the analysis of the situation in these cases shows, the causes of such a situation are most diverse--from irresponsibility and conservatism to the lack of objective possibilities to develop and introduce equipment and technology with the use of inventions.

It is necessary to actively and promptly take effective steps against workers and managers, who are guilty of red tape. The situation with the latter group of problems is more difficult. As is known, the assimilation of any

innovation and invention usually requires the performance of design, planning, and pilot technological operations, new materials, tooling, the production of nonstandard parts and assemblies, their assembly, and the adjustment and operational development of a new machine, instrument, or technological process. And, finally, in case of success it is necessary to organize the assimilation of this new equipment at the works.

The surmounting of these difficulties requires at times of the corresponding specialists and economic managers no less energy, efforts, creative and organizing abilities, and even engineering and production risk taking than the development of the innovation requires of the authors. Accordingly, all this should be stimulated well both materially and morally. We understand that with the increase of the number of inventions being introduced both the number of questions and the amount of such difficult and intense work will increase.

[Question] Do you believe that all inventions, which are protected by inventor's certificates, should be promptly introduced in the national economy? What are the possible costs in case of such an approach to the question?

[Answer] It is legitimate to pose the question: Is it necessary to strive regardless of anything to introduce all inventions, and if not all, then which of them and in what time? Such a question is entirely legitimate for the reason that frequently the appeals for the extensive introduction of inventions are still not stipulated by any conditions and circumstances. At the same time, if you imagine that all the tens of thousands of inventions, which are registered annually in our country alone, will be introduced, instead of a positive impact this can yield a negative economic result, which is connected with unplanned disturbances of production processes and accordingly the plans, the system of financing, supply, cooperation, transportation services, and manning.

[Question] But here, after all, is the problem: today to avoid such costs primarily such inventions, the assimilation of which takes place comparatively painlessly, are being introduced. But if introduction involves the need to settle certain questions and problems or others, which you listed, then.... For the surmounting of the difficulties they frequently include among the coauthors of the invention workers, on whom the progress of the matter depends to a great degree. Thus another cost of already a moral and even a legal nature, which stems to the unprepared, directive introduction of an invention, appears.

[Answer] Here it should be stipulated that it is a question of the workers, who actually contribute actively to the implementation of an invention, but owing to the lack of a sufficient creative contribution to the development of the invention itself legally cannot be recognized as coauthors. Here there is also a problem which awaits solution. Well, the stipulation is connected with the fact that, unfortunately, another category of workers, who find themselves among the coauthors only by virtue of their official position, without making any contribution to either the development or the implementation of the invention, is also encountered. This is already definitely a subject for court examination.

[Question] It is well known that inventor's certificates are issued to far from everyone who has applied to your department for them. What is the reason for the receipt by the State Committee for Inventions and Discoveries of a large number of groundless applications?

[Answer] Alas, there are a very large number both of such applications and of inventions, the introduction of which has not been prepared or in general is even not urgent. But 90 percent of them have been developed in organizations! What is the reason? First of all the utmost and active stimulation of the number of inventions and the underestimation of the significance of their urgency and technical and economic efficiency have an effect. This pursuit is to the detriment of the quality and the real utility of the creative search of inventors. To the detriment of the interests of the economy.

It is possible to name as positive achievements, which have been successfully implemented in the national economy, the developments of Moscow scientists headed by Academician of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin A.Kh. Sarkisov from the All-Union Scientific Research Institute of Experimental Veterinary Science. As a result of the performance of the planned work the scientists discovered the previously unknown property of some cells of parasitic fungi to develop lifelong immunity to trichophytosis (ringworm). This event caused a revolution in veterinary science. Both the urgent need for them and the fact that they did not require the substantial reorganization of production processes or significant capital investments for their implementation, contributed to the rapid and extensive use of the invented vaccines.

Here is another example. The pneumatic drills, which were developed by scientists of the USSR Academy of Sciences in collaboration with enterprises of the USSR Ministry of Construction and the Ministry of Construction, Road, and Municipal Machine Building, showed themselves to be very useful technical developments, which are especially effective under the conditions of municipal services. The technical solutions, on which the designs of the family of these machines are based, and the means of their use are protected by more than 200 certificates of authorship for inventions. The pneumatic drills make it possible to carry out the trenchless laying of underground service mains, to construct pile foundations under crowded conditions, and to drive light-weight construction components and metal pipes into the ground. As compared with the traditional methods of performing this work the cost and labor intensiveness of the operations decrease drastically, moreover, their performance does not disturb the operation of transportation or other surface service lines. It is now necessary to create new capacities for the production of pneumatic drills, the extensive use of which promises to yield by 1990 an economic impact in the amount of tens of millions of rubles.

[Question] But there are many promising developments, which could yield just as significant results, but have found themselves at a kind of intersectorial "crossroad" and without a manager who is interested in their assimilation....

[Answer] Of course. It is possible to group with them the use of so-called free iminoxyl radicals, which were discovered by Soviet scientists more than

20 years ago. These radicals, which are assigned to the category "chemicals of additives," make it possible to intensify many production processes and given the proper organization of the matter can raise to a qualitatively new level varnish and paint products and the production of synthetic rubber and to increase the life of polymer and fiber materials. It is possible to use them both in case of the production of petroleum for the diagnosis of the state of the petroleum-bearing formations and for the improvement of the keeping capacity of nutrients in case of the production of fodders. But here is the problem: for the implementation of the innovation it is necessary essentially for the first time to organize in chemistry the industrial production of organic free radicals. The difficulties here are first of all of a material and technical order. They, as well as the inadequate economic interest of the potential producers and users of these products are deterrents to the extensive use of free iminoxyl radicals in the national economy.

In connection with the reorganization of the economic mechanism in the direction of intensive development, which is envisaged by the precongress documents of the CPSU Central Committee, IT IS NECESSARY TO FIND EFFECTIVE FORMS AND METHODS OF THE IMPLEMENTATION OF INTERSECTORIAL INNOVATIONS. Here, in addition to resource supply, one should also tie in economic levers, including scientifically sound pricing, which would envisage the establishment of prices with the simultaneous consideration of the expenditures and effect of consumption, ensuring the necessary combination of the interests of the producers and users of the product and as a whole of the state.

[Question] What, in your opinion, are the means of increasing the effectiveness of invention?

[Answer] In order to achieve greater success in inventing, it is necessary along with the development of creative activity to devote no less attention to its aiming at the solution of the most important and urgent current and long-range problems. For this purpose IT IS NECESSARY TO ADJUST ACCORDINGLY THE INDICATORS OF INVENTING WORK: to specify the priorities, to interconnect these indicators, and, what is the main thing, to directly link them with the problems of the acceleration of scientific and technical progress, which are being solved in the country. For the greater success of the matter is necessary to increase the responsibility of all organs and people, who issue official conclusions on the novelty and utility of the technical solutions, which are being drawn up and submitted for recognition as inventions, for the objectivity of the evaluation, first of all on the basis of their topicality and efficiency. PERHAPS, IT MAKES SENSE TO INTRODUCE THE CORRESPONDING ADDITION IN THE DRAFT OF THE BASIC DIRECTIONS.

For the improvement of the use of the creative initiative of innovators IT IS ALSO NECESSARY TO RAISE SIGNIFICANTLY THE LEVEL OF THE WORK OF THE PATENT AND INFORMATION SERVICES OF ENTERPRISES AND ORGANIZATIONS, first of all in the area of the patent information service of new developments for the purpose of ensuring their novelty and efficiency. Here for the present the situation is still such that about half of the technical solutions, which are being elaborated as innovations, prove to be known from patent and other published information. Even with respect to the organizations of Moscow, where there is the All-Union Patent and Technical Library with a complete world collection of

many millions of descriptions of inventions, as well as many other technical libraries and collections, as a result of appraisal more than a third, that is, nearly 10,000 developments, which are submitted for registration as inventions, are annually not recognized as inventions due to the lack of novelty.

Today the party has posed the task of the acceleration of the socioeconomic development of the country on the basis of scientific and technical progress. The course of this acceleration will also depend to a significant extent on how efficiently it will be possible to use the creative forces of innovators and advanced technical thought. Therefore, it is necessary to solve the problems of improving inventing without delay, by the common efforts of the State Committee for Inventions and Discoveries, ministries and departments, and their enterprises and organizations.

THE INTRODUCTION OF THE CORRESPONDING GENERAL INSTRUCTIONS IN THE DRAFT OF THE NEW VERSION OF THE CPSU PROGRAM, IN WHICH THE CONSTANT INFLUX OF FRESH FORCES, INCLUDING FROM THE SPHERE OF PRODUCTION, IS NAMED AS ONE OF THE INDISPENSABLE CONDITIONS OF THE PROGRESS OF SCIENCE, WOULD PLAY AN IMPORTANT ROLE.

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PROBLEMS IN INTRODUCTION OF INTERSECTORIAL INVENTIONS

Moscow PRAVDA in Russian 17 Feb 86 p 7

[Article by V. Reut under the rubric "Accelerate Scientific and Technical Progress": "Creativity...Without a Guarantee"; first paragraph is PRAVDA introduction]

[Text] A large number of responses have been received to the article "An Invention Has Been Made" (PRAVDA, 16 September 1985). Several departments touched upon in it also responded.

Thus, USSR Deputy Minister of Ferrous Metallurgy N. Tulin reported that the article was examined by the ministry and the critical remarks were recognized as valid. Steps on the increase of the responsibility for the fulfillment of plans and assignments, which are connected with the development and assimilation of new equipment and advanced technology, including inventions, have been elaborated in the sector. In 1986 it is envisaged to assimilate 15 major inventions with an economic impact of about 3 million rubles. The overall organization of inventing, patent, and license work is also being improved.

Many readers in their letters confirm that inventing in the country requires improvement. This especially pertains to the assimilation of intersectorial and other major developments, which owing to their exceptional nature for a long time do not find an outlet into production.

Indeed, the significance of a development still by no means guarantees its safe passage into life. The letter of the group of developers of the electropulse anti-icing system (EIPOS) confirms this. Two folders of documents, which characterize the importance and effectiveness of the previously unheard of devices, but to an even greater degree reflect the torments of creativity and other things, were appended to the letter as arguments. Incidentally, the sweet torments of creativity, in bringing joy, and at times also disillusionment, as a rule, merely inspire further searches and usually do not require intervention from outside. With the other torments everything is much more complicated.

In its day the electropulse anti-icing system originated in the aircraft industry and is being used, in particular, on IL-86 airbuses. The system gave

a good account of itself, and it became clear that it is suitable not only for airplanes. Therefore, they transferred its developers to the USSR Ministry of Power and Electrification, where they organized for them a laboratory attached to the Moscow Kotloochistka Plant. From there, strictly speaking, their tribulations also began.

The system proved useful in many sectors, which did not have anything to do with power engineers. But the developers in sincere innocence considered it their duty to help those in need. And this in the end gave rise to a conflict situation. PRAVDA came out in support of the intersectorial innovation. At that time with the assistance of the State Committee for Science and Technology they turned the laboratory over to the All-Union Scientific Research and Technological Institute of Instrument Making of the State Committee for Hydrometeorology and Environmental Control: after all, the system is still an anti-icing one, while ice is a meteorological and, moreover, "intersectorial" phenomenon.

For the present the point is that the electropulse direction has become cluttered with new methods and processes, which are united by the general concept "technology of the EIPOS type." It is already protected by tens of certificates of authorship for inventions and patents of 30 countries. The basic advantages of the new technology--a wide area of application and great efficiency, the inexpensiveness of equipment, and small energy expenditures--have also been revealed more vividly. For example, the economic impact from the introduction of the electropulse system in just one drying chamber of the dairy plant in Beltsy came to many tens of thousands of rubles. In practice the unit pays for itself many times over in a year. The journal KHIMIYA I ZHIZN in the first issue for 1985 published a small article on developments of the EIPOS and received about 1,000 requests from enterprises and organizations: "We need such systems. Where is it possible to order them?"

But again why do meteorologists have to do all this? And last year they also decided to banish the adopted child:

"The food, chemical, meat and dairy, metallurgical, and other sectors need your equipment. What does this have to do with the State Committee for Hydrometeorology and Environmental Control? Nothing. And the control of icing is not our business. In short, we do not need you. Find yourself another boss. As of 1 January 1986 we are shutting your laboratory."

Last year the developers visited a lot of ministries and departments. More than 20 sectors announced and submitted for approval assignments on the production of systems like the EIPOS for their own needs, which constituted an impressive intersectorial comprehensive program. But when the conversation turned to finding the laboratory a haven, the responses were unequivocal: "You need an intersectorial manager. You simply will not blend in here...."

The microbiologists agreed to accept them. Under the threat of future dissolution the "pursued" seized convulsively the life buoy which had been thrown to them. True, when they asked for advice in the USSR State Committee for Science and Technology, they ordered them to be transferred to the intersectorial Scientific Research Institute for the Protection of Metals

Against Corrosion. The developers were bewildered: it is intersectorial, but very goal-oriented.... With whom should one become associated? And, without having become acquainted completely with the conditions of the transfer, they took, as it turns out, not the optimum step--toward those who had previously felt sorry for the subdivision which was nobody's. But when they realized it, it turned out to be too late: the corrosion fighters refused to accept them in their family.

And the complaints began. Their essence is that the "rescue action," which is being taken by the microbiologists, has nothing in common with the concern for the development of the new intersectorial scientific and technical direction. On the contrary, it serves merely as another step toward its further curtailment. And they cite the following figures: in the USSR Ministry of Power and Electrification 40 units made up the staffs of the laboratory (the "number"). Together with the laboratory 32 staff units were turned over to the State Committee for Hydrometeorology and Environmental Control. Only 18 are being turned over to the microbiologists. Hence, the collective of developers will disintegrate, while the new direction will wilt.

Here is what kind of situation formed with the intersectorial development. All this is because it was not able to acquire an interested manager, whose views would not be restricted by departmental blinkers. An enterprise, which is willing to set up the production of the systems, which have already been tested in practice, was also not found.

Meanwhile, as became known from the foreign press, the largest American firms established a special consortium for the development of electropulse equipment and technology, the ideas of which originated in our country. It includes a number of research, design, and production organizations, since the problem is intersectorial and promising. But the American specialists were 20 years behind our developers. Given the proper organization of the matter the Soviet Union could have already long ago sold not only licenses for electropulse equipment, but also units themselves.

This is not the only case. The fear of getting the sectorial uniform dirty with an intersectorial development is becoming for it literally an insurmountable obstacle. But it is well known that today the "growing points" of the most valuable innovations are not "within" the sectors themselves, but at the meeting points between them. That is, at the same boundaries, the stability of which owing to departmental principles the sectors guard like the apple of their eye. This hypertrophied sectorial "mine" and "not mine" for a long time now has been a thorn in the side of scientific and technical progress.

The establishment of interbranch scientific technical complexes and centers for the development and large-scale introduction of fundamentally new types of equipment and technology is called for in the draft of the Basic Directions. They are already emerging--on the basis of a number of academic institutes. This process will be developed. Here, too, it is important that the USSR State Committee for Science and Technology jointly with the State Committee for Inventions and Discoveries, in the field of view of which there are many intersectorial problems which for the present have not yet found a perceptible

outlet into practice, would strive more actively for the organization of the corresponding complexes and centers. In particular, it would not be a sin to establish under the State Committee for Inventions and Discoveries a kind of design and technological "kindergarten" with a pilot works for the testing and experimental development of conceived intersectorial inventions, a certain initial stage before their release into full life. And subsequently to see to it that in this "full life" they would not suffer in the search for a reliable haven. The committee has similar plans. Why not begin their fulfillment without delays, in order to prevent cases similar to the ordeals of the EIPOS intersectorial technology?

Incidentally, at times many sectorial innovations are also not lucky. Engineer N. Volkov from Lipki of Tula Oblast writes that individual inventions of his, which are connected with the mechanization of the labor of miners, showed in practice, in the mines, a great economic efficiency. However, the Tula Coal Association and the USSR Ministry of the Coal Industry are not creating the conditions for their extensive introduction, while they are rejecting without foundation other innovations, without even attempting to understand their technical essence. V. Brazhnikov (Dnepropetrovsk), V. Krysov (Sverdlovsk), V. Gluzberg (Kiev), and others report various kinds of difficulties of introduction.

The hidden reasons for the negative attitude of many economic managers toward the use of new equipment and technology lie in the fact that to date the "expenditure" method of management has predominated. The fulfillment of the production plans with respect to the volumes of the sale of products in rubles does not interest economic managers in the use of innovations which make it possible to intensify and to decrease the cost of production. Under such conditions it is unprofitable for enterprises to decrease the outlays of raw materials and materials on items, to introduce equipment and technology, which speed up production, and to replace the output of obsolete products with new, more advanced, and inexpensive products. On the contrary, it is more profitable to use expensive raw materials and to introduce "innovations" which increase the cost of products. For the profits of enterprises and all the components of incentives depend on the volumes of the sale of products in rubles.

It is not a question of introducing all inventions in succession and rapidly--this is inconceivable. And not only because such an "end in itself" would keep sectors in a fever of permanent and, therefore, by no means useful renovation. Far from all inventions truly and unconditionally refute what has already been achieved, while others do not carry a store of such high efficiency, which would justify immediate intervention in the course of production. In general in each case of the assimilation of an innovation it is necessary to be guided by technical and economic expedience.

But what it is necessary to do, many authors of letters believe, is to establish a clear procedure of the assimilation of pioneering inventions, which do not have analogues, and other important inventions, which require specific financial, material, and manpower expenditures. Their implementation should be envisaged in production plans and projects. Since any innovation yields the greatest positive impact in case of its large-scale use, it is also

important to see to its "duplication." And, hence, to determine in advance the spheres of its use and to establish contacts with future users. The principles of such work should be established already today.

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INTERNATIONAL S&T RELATIONS

TIMISOARA POLYTECHNICAL INSTITUTE COOPERATES IN ROBOTICS

Moscow PRAVDA in Russian 10 Apr 86 p 4

[Article by PRAVDA special correspondent V. Vedrashko under the rubric "From the Notebook of the Journalist" (Bucharest-Moscow): "Enthusiastic People"]

[Text] Many robots, which are being used in the output of Romanian products, are obliged for their origin to the scientists and students of Timisoara Polytechnical Institute.

The contact, or to put it better, the firm relations of science and production are helping here, in Timisoara, to solve many urgent problems of technical progress.

"Of course, we are far from complacency," Professor Tiberiu Muresan says. "Yes, strictly speaking, in robotics today there also cannot be stagnation. At the institute for a long time they headed for the assimilation of the new matter, the instructors taught students and learned themselves. The interest in robots gradually gripped people. They established their own small production base. Our 'minifactory' also has its own plan--the annual volume of product sales is estimated at 20 million lei. In 1980 they signed with the Electromotor Plant the first contract for the development and installation of a flexible production line, and in February 1982 it began to operate. At the plant the section of robots emerged. The matter began to progress. In Timisoara our robots are already operating at several enterprises."

The institute has firmly taken one of the leading positions in robot building of Romania. The collective of instructors and upperclass undergraduates not only are developing, designing, and producing automatic machines, but are also taking trouble about the conditions for their introduction. That is why good relations with plant personnel and a good knowledge of production are a customary and natural thing here.

At the institute they are giving elective courses on robotics. They are very popular, since they reveal to young people the extensive prospects of this technical direction.

"In Romania for the present there are no special plants for the production of robots," T. Muresan notes. "For this reason our research is so important. It

is possible to say that approximately a fourth of the robots in the country were developed by our, Timisoara technical thought."

The instructors are fundamentally combining instruction and scientific work. The research, which is being conducted in the chairs and in laboratories, is closely linked with practical implementation. Of course, we are hungry for scientific and technical literature, they told me at the institute. We are trying to be informed about innovations, know Soviet works on robotics and rate them highly, and are making contacts with specialists in the USSR. The Moscow Higher Technical School and Odessa Polytechnical Institute are for us well-known and respected addresses. The people with whom I spoke also shared a wish: it is necessary to expand in every way the exchange of scientific and technical information between our countries. This is a vital question. With its settlement many current problems would be overcome more rapidly.

The Electromotor Plant in Timisoara is the largest enterprise of its sector in Romania. Electric motors of many types, particular for washing and sewing machines, for hoisting mechanisms and escalators, as well as fans, electric pumps, and various motors come off its conveyors. Frequently the plant produces motors in accordance with the orders of consumers. A portion of its products is being sent to the USSR.

Cornel Carpinisan, chief engineer of the plant, stated frankly that types of motors, the technical characteristics of which are higher than those of Romanian motors, are being produced in the other CEMA member countries. This level still has to be achieved. And then, as they believe at the plant, it will be possible to cooperate even more effectively with partners from the fraternal countries.

The economic summit conference of the CEMA member countries in Moscow indicated the need to expand the exchange of information on scientific and technical achievements. It is necessary, said the people with whom I spoke, to acquaint each other more actively with one's own results and not to stint catalogues and prospectuses. To borrow means not to waste efforts.

The plant personnel, as we see, repeated the thoughts expressed at the Polytechnical Institute.

At the plant they are updating the machines and equipment dynamically as compared with other motor building enterprises of Romania. The natural replacement of personnel is also occurring.

"Young people, who are learned and inquisitive, are coming to the collective of 5,000," Mihai Grozescu, secretary of the plant party committee, says. "They require much attention. Here one must also not relax the concern for the old, experienced personnel."

The conversation turns to new equipment.

"The section of robots recently appeared here, they entrusted me to manage it," Atanasie Costi says. "It is natural that in it young people are

managing. I, as you see, am already older than them, gray hair gives me away. While young specialists, whom, in particular, Timisoara Polytechnical Institute is also training for us, are assimilating the new equipment."

But how do the people, who have been working a long time at the plant and who have become accustomed to their own machine tool and like their occupation, feel about robots?

A. Costi cites the following example.

"Recently they installed production painting equipment. Initially the people greeted the innovation without particular enthusiasm. However, some time passed, and, having seen the results, they changed their attitude. For good-looking work makes a person happy. While the robots 'know' their job well."

The operations, which are difficult and harmful to the health, are first of all being robotized.

They are solving the social problems at the Electromotor Plant with no less persistence than production problems and in close connection with them. Technician Alexandru Gherbes, deputy chairman of the plant committee for social questions, told about this.

"We are devoting particular attention to the provision of people with housing, to the arrangement of daily life, and to medical service. Each of our workers has the opportunity to dine inexpensively and well at the plant dining room. On Sundays many people who so desire leave for the recreation zone in the suburbs. Excursions and tourist outings, competitions and sporting matches are popular--at the plant there are 30 soccer teams. A favorite place for spending leisure time is the plant club. There is also a circle of designers here."

Economist Vasile Rotarescu, a member of the plant committee of the Union of Communist Youth, adds that the life of people is becoming better, and it would be a mistake not to point out several difficulties which follow from this well-being. The cultivation in a person of a proper attitude toward the real values of socialist civilization is an integral part of the concerns of the organizations of the Romanian Communist Party and the Union of Communist Youth at the plant.

The conversation returns again to the "production routine." To seek and find the best and to make it accessible to the entire collective--this aspiration is divined in everything, about which the workers of the Electromotor Plant relate.

But here are several, so to speak, personal touches to their portraits. Atanasie Costi, a 55-year-old specialist in robotics, who has traveled throughout the world on business and has visited the Soviet Union alone 18 times, admits that he likes Moscow and Paris more than all cities. Alexandru Gherbes, a 36-year-old trade union activist, let fall in the conversation: if only one could live in peace, if only one could raise children peacefully. Technician Vasile Rotarescu, who is 31, dreams of

visiting the Hermitage once again and, if he is able to, of visiting Samarkand. Mihai Grozescu, secretary of the party organization, is nearly 40. At times he devotes his leisure to the solving of riddles and crossword puzzles and has a passion for historical novels.

"And what about you, comrade chief engineer?"

"My passion from a young age has been philately," C. Carpinisan replied. "Believe me, this is an excellent pastime. Incidentally, I am seeking a serious partner for correspondence."

The workers of Timisoara.... The main features, which unite the people of this city, are probably their enthusiasm and the aspiration to become firmly established in labor and to grow spiritually. The socialist state and its citizens themselves are creating newer and newer opportunities for this.

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REGIONAL ISSUES

INTRODUCTION OF ACHIEVEMENTS OF KAZAKH ACADEMY OF SCIENCES

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 2, Feb 86 pp 23-26

[Article by President of the Kazakh SSR Academy of Sciences Academician A. Kunayev: "Scientists for Production"]

[Text] In the draft of the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000, which by right is a document of enormous political importance, the role of science in the economic strategy of the party is defined. Clear tasks in the area of the increase of the level of the well-being of the people and the strengthening of the economic potential and defensive might of our homeland are posed for scientists.

In light of these demands the Academy of Sciences is called upon hereinafter to coordinate scientific research work. The responsibility for the development of the theoretical principles of fundamentally new types of equipment and technology is increasing. The importance of the work on the quantitative transformation of productive forces, the changeover of the economy to the path of intensification, and the increase of the efficiency of social production and product quality is increasing substantially.

In summarizing the basic results of the five-year plan, it should be noted that the republic Academy of Sciences is conducting on a broad front promising basic and applied research and is taking the necessary steps on the concentration of forces and assets on the solution of urgent problems for the republic.

The network of scientific institutions of the academy is continuing to be developed: the institutes of geography, the ionosphere, organic synthesis and coal chemistry, microbiology and biochemistry were organized. The Institute of Labor Hygiene and Occupational Diseases was transferred to the academy from the system of the Ministry of Health. In Karaganda the Central Kazakhstan Department, which concentrated all the research being conducted in this region, was established.

In speaking specifically about the research of the scientific institutions of the academy, it is necessary to stress that it has a traditionally practical orientation and always rests on a strict scientific basis. Thus, mathematicians are developing a set of computer programs which are intended

for the current objective forecast of atmospheric pollutants (the TOPAZ system). This system is already at the stage of pilot operation at the academy's computer center.

Programs, which make it possible to calculate the water supply of irrigated areas and to help in the statistical processing of hydrogeological information, have been prepared for the Kazakh State Institute for the Planning of Hydraulic Structures and Rural Electric Power Plants. An algorithm of the numerical modeling of one of the technological processes has been given to the Alma-Ata Plant of Heavy Machine Building.

Physicists are conducting extensive research in the area of the vulnerability of materials to radiation damage and the change of their properties in case of irradiation by a stream of electrons and high-energy charged particles. Fundamentally new results, which are of practical importance, have been obtained.

The work of the Institute of High Energy Physics was commended by a certificate of the Exhibition of USSR National Economic Achievements. Equipment, which made it possible to automate the processing of experimental data, to increase the level of scientific research, and to shorten the time of physics experiments, was developed here.

Important research, which is of theoretical and practical significance, was conducted by scientists of the Earth Sciences Department. For the series of works "Metallogeniya Kazakhstana i kompleksnye issledovaniya glavneyshish gornorudnykh regionov" [The Metallogeny of Kazakhstan and Comprehensive Studies of the Most Important Mining Regions] a large group of scientists of the Institute of Geological Sciences imeni Satpayev was awarded in 1985 the USSR State Prize. It can be asserted that this 11-volume work will serve as the fundamental base for the planning of prospecting operations for a long period.

Seismologists were able to solve a most important national economic problem. They developed a general theory of the rotation of the earth and settled key questions of the mechanics of earthquakes. This made it possible to compile a map of sites of the possible occurrence of strong earthquakes in the southeastern part of Kazakhstan during the next 10 years.

A new method of seismic microzoning was also developed and a seismic map of Alma-Ata and the suburbs was prepared on its basis. It is possible to judge its practical value from the following fact: it was included in the catalog of basic republic construction norms. The economic impact from the introduction of the new method of microzoning comes to 12 million rubles.

The collective of the Institute of Mining is successfully solving the problems of the electrification of mining machines and the use of robotics in the mining industry. On this basis the scientists proposed a fundamentally new flow-line technology of the mining of ore.

The Institute of Hydrogeology and Hydrophysics is solving important problems. These are the forecast of the change of hydrogeological conditions in the

basin of Lake Balkhash and the determination of the degree of water supply of the territory of the republic with ground waters and the scale of their use for irrigated farming. The recommendations of the institute served as the basis for the establishment at a number of farms of tracts which are irrigated with ground waters.

In recent years the decrease of the level of the Aral Sea and in this connection the undesirable economic and social processes have been causing anxiety. The Institute of Geography prepared recommendations on the moderation of the negative consequences of the drying up of the sea.

A method of forecasting the mud flow danger in mountainous regions of Kazakhstan is being used successfully in practice.

The following fact testifies to the significance of the activity of scientists of the Chemical and Technological Sciences Department: an economic impact of 250 million rubles was obtained from the introduction of their scientific developments. The research on the complete processing of silicon-phosphate, aluminosilicate, and titanium-containing raw materials, the autogenous smelting of copper concentrate, the assimilation and production of ferrophosphorus of improved quality, the development and improvement of advanced hydrometallurgical methods of obtaining compounds of rare metals, and vacuum metallurgy received a high rating.

Scientists of the Institute of Chemical Sciences are working successfully. They have to their account many successfully solved urgent problems of the chemistry of high molecular compounds.

At enterprises of the Main Administration for the Transport and Delivery of Crude Oil, for example, the Plastobit-2M anticorrosive coating, which in its quality significantly surpasses others, is being used extensively for the insulation of petroleum pipelines.

The intensive technology of obtaining mineral fertilizers in the form of polymer phosphates, which are recognized as the best of the fertilizers of this type, does not have analogs in world practice.

A number of new effective fireproof coatings for various construction materials have been developed and introduced here.

The recommendations of chemical scientists on the use of new regulators of the growth of agricultural crops, which make it possible to increase the volume of the productive mass in harvests of sugar beets, corn, and potatoes, are being used successfully.

In accordance with the technology of our scientists feed cellulose, which is obtained from various agricultural waste products and the food value of which is equated with alfalfa hay, is being used at many livestock complexes of the republic.

The Institute of Organic Catalysis and Electrochemistry earned extensive fame by its work on the obtaining of high-quality fats, aromatic and medicinal

substances, and vitamins. It is also studying the questions of the purification of industrial and technological gases and the improvement of the production of ultrapure metals.

The work of scientists of the Institute of Petroleum and Natural Salts Chemistry is helping to solve the problem of developing the natural resources of Western Kazakhstan. The comprehensive study of the physical chemical properties and hydrocarbon composition of crude oils is being conducted here. A new technology of increasing the degree of recovery of high-paraffin crude oils has been introduced at the deposits of the Mangyshlak Petroleum Production Association.

Research is also being conducted in the field of agriculture. A number of scientific recommendations have been prepared for the purposes of increasing fodder production, intensifying the combating of diseases of animals and plants, and expanding breeding work.

In particular, scientists of the Institute of Soil Science are working on the development of the solonetz lands of the republic and are helping to increase the yield of agricultural crops. In the past 3 years alone 15,000 hectares of such lands have been developed on the Akdalinskiy Tract. As a result the saving came to more than 7 million rubles.

The technology of the ensilage of fodders with the use of dry bacterial ferments, which was developed by scientists of the Institute of Microbiology and Virology, is being introduced.

Crossbred semifine-wooled meat and wool sheep, which were bred by the Institute of Experimental Biology, are being successfully used at farms of southeastern and Eastern Kazakhstan.

Social scientists of the Academy of Sciences are studying the problems of the development of the material and technical base of communism, the improvement of the production relations of developed socialism and the strengthening of the socialist way of life, the laws of the development of history, the state, law, literature, and language.

The Institute of Economics is in charge of the formulation of a comprehensive program of scientific and technical progress of the republic for 1991-2010 (by five-year plans). This will make it possible to take more completely into account the potentials of science and technology in current and long-range plans, as well as the noted trends in social development and to coordinate the activity of all production units and science for the accomplishment of the posed tasks.

An extremely important task is to ensure the interaction of the plans of scientific research with the state plan of economic and social development of the Kazakh SSR. The Intensification-90 Program, which was formulated by scientists and in the implementation of which more than 20 scientific institutions are being enlisted, serves this goal.

The academic scientific potential is being concentrated on the following basic directions of the increase of the efficiency of the economy: the development and introduction of new equipment and advanced technology; new types of materials; new products; means of mechanization and automation, as well as on questions of the introduction of computer technology.

The strengthening of the relations of science with production is characterized by the practical implementation of the results of research. Annually about 200 recommendations of the institutes, from the implementation of which during the 11th Five-Year Plan an economic impact of 448 million rubles was obtained, are being introduced at enterprises. A number of newest scientific instruments, which do not have analogs and are of great national economic importance, have been developed. New metallurgical processes, which ensure a low-waste and waste-free technology, are being introduced.

[Boxed item: Pavlodar Oblast. Scientists and production workers of the Beskaragayskiy State Pedigreed Stock Farm are continuing the work on the improvement of the breed of Kazakh merino of the Beskaragayskiy type, which was developed here. Recently inventor's certificates for two new lines of animals, which are characterized by a high yield of pure fiber and the early maturity and large size of the animals, were received here.]

In the photograph [Photo not reproduced]: B. Alkeyev, director of the Beskaragayskiy State Pedigreed Stock Farm, (on the left) and chief livestock expert K. Baydauletov (on the right) in the laboratory.]

The time of the implementation of completed scientific work, however, does not always satisfy us. In this connection the constant improvement of the forms of the planning and integration of science and production remains a vital necessity.

We are devoting more and more attention to the further development of business cooperation with ministries and departments in order to carry out work rapidly from research to its implementation, to use in every possible way the goal program method of planning with respect to the most important scientific and technical problems, and to draft joint coordinated plans in the main directions of the development of sectors.

The joint jobs, which are being performed on the basis of economic contracts, as well as contracts on creative cooperation and standard contracts for the transfer of their scientific achievements, have justified themselves. During the past five-year plan more than 200 jobs were performed with ministries and departments. Moreover, annually up to 400 jobs are performed on the basis of the conclusion of economic contracts.

A coordinating council for problems of the development of nonferrous metallurgy, of which leading scientists of the Academy of Sciences and specialists of the Ministry of Nonferrous Metallurgy became members, was established in order to strengthen the creative relations of scientific institutions with enterprises and organizations of ministries and departments. The interdepartmental council (in Karaganda) for the coordination of

scientific research in the field of ferrous and nonferrous metallurgy, chemistry, geology, and mining is serving this purpose.

The lack at the academy of its own pilot experimental base is checking the introduction of developments in practice. The lag of the construction of pilot works at enterprises of ministries is also interfering. The dissemination of the electrothermal method of processing secondary lead raw materials and semifinished products, for example, is being delayed.

Now no one doubts any longer the value of the phosphate slags of the Karaganda Metallurgical Combine as mineral fertilizers, but for the present they are practically not being used.

The decision was made long ago to organize the pilot industrial production of glass ceramic slag items (on the basis of phosphorus slags) at the Chimkent Combine of Asbestos Cement Components, but the republic Ministry of the Construction Materials Industry is not displaying great persistence in the implementation of our developments. The same thing also applies to the USSR Ministry of Mineral Fertilizer Production.

The cited examples once more confirm that today it is necessary to speed up the introduction of the achievements of science in production. Without this one will not solve the problems of intensifying the economy of the republic.

The accumulated scientific potential makes it incumbent to seek new, more effective forms of the contact of academic science with production. For the purposes of increasing the effectiveness of research and speeding up the use of completed scientific developments the decision on the establishment on the basis of the scientific institutions of the Academy of Sciences, enterprises, farms, and organizations of the Ministry of Nonferrous Metallurgy and the State Agroindustrial Committee of scientific and technical complexes--the Mining, Nonferrous Metallurgy, and Selection Complexes--was adopted.

During the commenced 5-year period the main attention of scientists is being focused on the most promising directions of the development of scientific and technical progress in the national economy of the republic. The basic ones of them are the following:

--the development of basic and applied research in the field of the natural sciences on the problems of geology, mining, and the complete use of raw materials;

--the development of fundamentally new combined technologies of the extraction and processing of ores with the use of automated complexes, as well as electrochemical and microbiological methods and highly efficient extraction and sorption processes;

--the expansion of research in the field of technical cybernetics, robotics, and the automation of production processes and scientific experiments;

--the further intensification of the new directions in the field of genetics and molecular biology;

--the development of research on the creation of low-waste and waste-free, resource- and energy-saving advanced technologies;

--the intensification of scientific research and the shortening of the time of the conducting of pilot and pilot industrial tests and the introduction of completed jobs in practice;

--the improvement of the organizational and economic forms of the integration of science, technology, and production.

The Presidium of the Academy of Sciences in conformity with the instructions of the Kazakh CP Central Committee and the republic government has outlined for the 12th Five-Year Plan a number of organizational measures, which are aimed at the perfection of the structure, the improvement of the organization, and the increase of the effectiveness of scientific research.

The further purposeful development of science in directions, which are extremely important for the republic, dictates the need for the organization of new scientific institutions, first of all such ones as the Physical Technical Institute and the Institute of Inorganic and Applied Chemistry. This will make it possible to intensify research in the field of solid state physics, solar power engineering, radio electronics, and automation, as well as the efficient complete use of the phosphorites of the Dzhambul-Karatau Basin.

The first regional scientific center of the academy--the Central Kazakhstan Department of Science--will undergo further development: the institutes of the comprehensive development of mineral resources (in Karaganda) and ecology and nature conservation (in Tselinograd) will be established. They are called upon to develop research in the interests of scientific and technical progress.

The need has arisen to establish in Guryev on the already existing scientific base the Western Kazakhstan Regional Center.

The Presidium of the Academy of Sciences considers it necessary to enlist local organs of management more extensively in the process of introducing scientific developments. We consider it expedient to use the experience of the Ukraine in the establishment under oblast and city party committees and executive committees of the soviets of people's deputies of commissions for the promotion of scientific and technical progress.

The participation of the Kazakh SSR Academy of Sciences during the commenced 5-year period in the implementation of 24 all-union comprehensive programs on the solution of the most important scientific and technical problems should be considered recognition of the great scientific value of our research.

The Kazakh SSR Academy of Sciences is the main organization for 11 of the 19 all-republic programs of 1986-1990. We will concentrate scientific forces and material and technical resources on the comprehensive solution of such important urgent problems as the development of solonet lands, the complete

use of mineral resources, the use of polymers in the national economy, and the development of effective methods of controlling corrosion.

Scientists have to perform responsible work in order to speed up the development of promising scientific directions and fundamentally new types of equipment and technology, to increase the effectiveness of scientific developments, and strengthen the contacts of science with production.

The role of the Academy of Sciences as the coordinator of all scientific research work in the republic is great. A wide range of measures, which make it possible not only to develop the basic sciences, but also to use in practice the results of research for the attainment by social production of a qualitatively higher level, has been outlined. It is appropriate to note that the interaction of all the sectors of science--the academic sector, the sectorial sector, and the sector of higher educational institutions--will be improved.

The successful accomplishment of the tasks posed by the party will require painstaking, persistent work on the selection, placement, and increase of the skills of personnel and the strengthening of the pilot experimental base. It is necessary to do much so that the irregularities in material and technical supply and in the provision of modern instruments, equipment, and means of automation would affect to the least degree the work of scientific institutions.

The scientists of the Kazakh SSR Academy of Sciences clearly picture the difficulty of the tasks, which have been posed for science during the 12th Five-Year Plan, and their responsibility for the pace of scientific and technical progress in the republic. The great creative activity of scientists and their aspiration to make their own contribution to the national matter of intensifying the social and economic development of the country are a guarantee of the successful accomplishment of these tasks.

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CONTRIBUTIONS OF AZERBAIJAN TO SOVIET SPACE RESEARCH

Anniversary of First Flight

Baku BAKINSKIY RABOCHIY in Russian 10 Apr 86 p 2

[Article under the rubric "On the Occasion of the 25th Anniversary of the First Flight of Man Into Space": "Azerbaijan on the Trajectories of the Universe"]

[Text] Throughout the planet and throughout the country the 25th anniversary of the first flight of man into space is being widely celebrated. This fills our hearts with pride in the feat of the first cosmonaut of Earth, USSR citizen and communist Yu.A. Gagarin. Today you visibly sense the enormous contribution of the Soviet people, science, and technology to the development of world astronautics. A new stage in the development of many scientific disciplines began with that first flight. New fields of basic and applied research also trace their history from this reference point. Among them is space natural history.

Scientists of Azerbaijan are also making their contribution to this work. The workers of the national economy are using the results achieved by them in practice. Space natural history--the youngest science in Azerbaijan--has become firmly established and is constantly consolidating its positions in the republic. And it is noteworthy that the scope of research in the republic, which is connected with space, is broader and broader. More and more scientific collectives and higher educational institutions are becoming involved in it. The scientists of Azerbaijan, who are studying space, are working in close contact with colleagues from all the regions of the Soviet Union and the CEMA countries. The international aerospace experiment Gushen-84 was confirmation of this and at the same time recognition of the contribution of science of the republic. Since that time new research has been conducted. Now the scientists of the republic are striving to place the achievements of young space science most completely at the service of the intensification of the economy, the acceleration of the socioeconomic development of the country, and the imposing plans which were outlined by the 27th CPSU Congress.

Baku BAKINSKIY RABOCHIY in Russian 10 April 86 p 2

[Article by Doctor of Technical Sciences T. Ismailov, general director of the Scientific Production Association of Space Research attached to the Azerbaijan SSR Academy of Sciences, under the rubric "Scientific and Technical Progress: Reserves of Acceleration": "The Space Testing Grounds of the Republic"]

[Text] In the 25 years that have passed since the flight of the first cosmonaut of the planet, Yuriy Alekseyevich Gagarin, Soviet astronautics has covered an enormous path. In essence, a powerful scientific production sector of the national economy was established.

The themes of the work of our Scientific Production Association of Space Research are also diverse. Here, in particular, the theoretical principles of the construction of aerospace systems of the study of Earth from space were developed, the scientific methods, physical, technical, design, and technological principles of their development were specified. The practical implementation of these principles made it possible to develop the first automated subsatellite information measuring system in the country, which is intended for the online solution at aerospace control and measuring testing grounds of scientific methods and technical problems of space physical geography. In all more than 50 scientific instruments, many of which are unique and were executed at the level of inventions, were developed and produced at the association in accordance with these problems.

The questions of the physical and technological principles of the development of a fundamentally new element base of instrument making, the scientifically sound choice of base microelectronic assemblies in case of the designing of instruments and systems based on them, and the choice of and changeover to new functionally complex elements on the basis of the use of new physical phenomena hold a significant place in the activity of the collective. The results of this research are being used extensively in instrument making developments, as well as have been recommended for introduction at specialized and scientific institutions.

The 1980's are characterized by the fact that a number of scientific and production organizations of the republic began the use of space information in the practical implementation of the USSR Food Program. Scientific methods and experimental work, which is aimed at the development of the methodology of the identification and forecasting of the state of agricultural crops, forest pasture and hay lands, and saline and eroded lands, was performed. These developments, which are also being carried out today with the participation of institutes of the republic Academy of Sciences (the Institute of Geography, the Institute of Geology, the Institute of Genetics and Selection, the Institute of Botany) jointly with organizations of the Azerbaijan SSR State Agroindustrial Complex, have the goal to study in detail agricultural resources by means of space, airborne, and land-based means and to determine the prospects of their development. Moreover, it has now already become possible on the basis of the obtained primary materials, which were processed with the aid of special hardware, to begin the compiling of large-scale soil

and geobotanical maps, to carry out the passportization of pasture lands, and so forth.

The scientific and technical potential, which has been accumulated in recent years in the republic, determined its special place in the total complex of space research, which is being conducted not only in the country, but also in the countries of the socialist community. This concerns, first of all, the problem of the development of the theory, equipment for the support of, and methods of the conducting of aerospace experiments at control and measuring testing grounds. The institutes of the Physical, Technical, and Mathematical Sciences Department of the Azerbaijan SSR Academy of Sciences (the Institute of Physics, the Institute of Mathematics and Mechanics) have been enlisted in the solution of these problems, while the Scientific Production Association of Space Research is the main organization of the country and the Interkosmos Council.

The scientific research and experimental work, which is being performed in the republic, is making it possible not only to solve terrestrial problems, but also to encroach upon such a classical field of knowledge as astrophysics. Definite successes also exist here. In particular, our scientists with the participation of specialists of the Institute of Space Research of the USSR Academy of Sciences developed a unique X-ray telescope--the RS-17 spectrometer. This first satellite-borne instrument, which was designed in the republic, was successfully used in 1984 on board the manned Salyut-7 complex during the conducting of the Siren international Soviet-French experiment.

It is appropriate to note that a significant complex of operations is being conducted in the area of astronomy at the Shemakha Astrophysical Observatory imeni N. Tusi, the scientists of which are well known in the country and outside it for their interesting scientific results in the study of the properties of transient stars and novas, planet giants, relativistic processes in space, and so forth. The decision of the congress of the International Astronomical Union to name one of the craters of the planet Mars after the Azerbaijan scientist Nadir Ibragimov, whose works led to the more correct understanding of the physical conditions on Mars and were used during the detailed study of the topography of the planet and the making of a map of the Martian relief, was convincing evidence of the real contribution of the astronomers of the republic to the development of science. Let us note that the confirmation of the scientific concept of N. Ibragimov became possible owing to flights of spacecraft, which were provided with the appropriate photographic and television equipment.

For a number of years work in the area of space science and technology has also been successfully developed at the higher educational institutions of the republic. Here, first of all, it is necessary to note the large amount of research which is being conducted at the Azerbaijan Institute of Petroleum and Chemistry imeni M. Azizbekov on the development of methods and hardware of the automated processing of aerospace information. The experience of this institute is also interesting for the fact that at the Chair of Information Measuring and Computer Technology they are concerned already today about the training of skilled scientists and engineers in this field of space science

through the educational scientific production complex, which was established on the initiative of Hero of Socialist Labor Academician I.A. Ibragimov, an organizer of science and the higher school, who is well known not only in our country, on the basis of an affiliate of the chair and a number of subdivisions of the Scientific Production Association of Space Research. Space science is also gaining strength at the Azerbaijan State University imeni S.M. Kirov (the Chair of Astrophysics), the Azerbaijan Institute of Agriculture imeni Agamaliogly, and other higher educational institutions.

Our Soviet program of the development of space is connected, first of all, having obtained this great power, with giving people an understanding of the laws of nature and their mastery. The intensive development in our country of young science, such as space natural history is, is an eloquent example of this. The development of this science, in particular, in the socialist countries, in many respects is predetermined by the fact that the USSR is affording them the possibility of the most extensive use of space rocketry for the solution of the broadest group of scientific and national economic problems in their own interests.

The program on the study of Halley's Comet was a vivid example of the peaceful space aspirations of Soviet scientists. The research was impressive with respect to the scientific and technical level and global nature and the scale of the posed problems. In this respect the project, undoubtedly, is of epoch-making importance. Unique results were obtained. And the scientists of our country willingly offered to their foreign colleagues, including American colleagues, to make available to them the results of their research and observations in the name of the development of world science.

Our program of the service of space of Earth is intended for long years. But it is possible and necessary to implement it significantly more rapidly. We support the idea that in the name of this great goal the scientists of all countries would unite their forces and, what is the main thing, space should serve peace, there cannot be a different approach.

In the photos [photos not reproduced]: twice Hero of the Soviet Union USSR Pilot Cosmonaut Leonid Popov (on the right) and a group of participants in the experiment; senior computer operator Tatyana Musayeva during the processing of aerospace information; the assembly shop. The instruments, which were developed at the design bureaus of the Scientific Production Association of Space Research of Natural Resources of the Azerbaijan SSR Academy of Sciences, originate here; the 2-meter telescope of the Shemakha Observatory is ready for observations.

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USE OF SCIENTIFIC POTENTIAL OF KIRGHIZ HIGHER SCHOOLS

Frunze SOVETSKAYA KIRGIZIYA in Russian 6 Feb 86 p 3

[Article by K. Rakhimov, chief of the Department of Scientific Research Work of the Kirghiz SSR Ministry of Higher and Secondary Specialized Education: "The Potential of the Chair. How to Use the Scientific Forces of Higher Educational Institutions More Completely"; capitalized passages published in boldface; first paragraph is SOVETSKAYA KIRGIZIYA introduction]

[Text] More than half of the candidates and doctors of sciences of the republic work at higher educational institutions. This is a significant force. But, as was correctly noted at the 18th Kirghiz CP Congress, the return of science of the higher educational institution far from conforms to either its possibilities or the requirements of the times. Moreover, one must not forget--and attention was directed to this at the conference on questions of the acceleration of scientific and technical progress in the CPSU Central Committee--that the increase of the scientific return of higher educational institutions creates the conditions for the higher quality training of specialists, who from their undergraduate days would become familiar with research work.

It is no secret that the opinion that only academic and sectorial scientific research institutes should be concerned with science, still exists. The lack of confidence in science of the higher educational institution had the result that many enterprises, ministries, and departments of the republic reluctantly enlist higher educational institutions in the solution of technical problems. As a result the majority of economic contractual scientific research operations, which are performed, for example, at Frunze Polytechnical Institute, are, so to speak, of an all-union nature--their clients are located at times far beyond Kirghizia. It would not be bad, if in this case the national economy of the republic were not experiencing an urgent need for the assistance of science.

The planning and financing of scientific research in departments and ministries are not conducive to such close cooperation. In spite of the fact that at the enterprises subordinate to them the proportion of manual labor is still high and its productivity is low, they often do not adequately finance economic contractual operations and do not enlist scientists for the solution of their problems. It is difficult, for example, to "beat" money for economic

contractual themes from construction ministries, the Ministry of the Construction Materials Industry, and others. Although, as a rule, there the large amounts of assets are not being assimilated for these purposes. The largest detachment of scientists of the republic in the construction sectors--more than 80 percent--is concentrated at Frunze Polytechnical Institute. However, for the reasons named above their contribution to the solution of the problems of construction is more than modest.

The use of the scientific potential in Osh Oblast is arousing serious anxiety. More than 400 instructors, including 131 candidates of sciences and 5 doctors of sciences, work at the pedagogical institute here. However, their forces and potentials are scarcely being used in the national economy. Only two chairs have been enlisted for this, and then not entirely. Thus, since 1983 the Chair of Zoology has been conducting research on the economic contractual scientific theme "Pests of Nut and Fruit Forests of Southern Kirghizia and Steps on Combating Them." The annual amount is 10,000 rubles, the client is the republic State Committee for the Forestry Industry. Rather good results have been obtained. A schematic map of the occurrence of harmful pests has been drawn up, recommendations on combating them have been given.

But at the other chairs of the institute--physics, chemistry, mathematics--they are waiting for a kind of invitation. And at the industrial enterprises of the oblast, in turn, they are not displaying an interest in cooperation with scientists of the institute. As a result everyone is a loser, for such isolation from each other does not do either the production workers or the higher educational institution good. And in order to get the potential partners out of the present standstill, apparently, the intervention of the Osh Oblast Party Committee is necessary.

It is also possible to address the same advice to the Issyk-Kul Oblast Party Committee, since a similar picture is forming at Przhevalsk Pedagogical Institute. The scientific potential of the pedagogical higher educational institutions in Frunze is also being poorly used. True, in recent times definite changes have been noted here. But these are just the first steps. We have great complaints against the scientists of the Kirghiz State University, the scientific return of which leaves much to be desired. This especially pertains to the collectives of the Biology and Economics Faculties. Whereas in 1984 economic contractual work for a small amount was performed at the Biology Faculty, last year it was halted altogether. The amount of scientific research among economists is very small. Not by chance, therefore, were the university and its management sharply and justly criticized in the accountability report of the Central Committee to the 18th Kirghiz CP Congress.

Meanwhile experience in strengthening the contacts of science of the higher educational institution with practice exists in the republic. Thus, during the past five-year plan two educational scientific production associations and two sectorial laboratories were established at Frunze Polytechnical Institute. The chairs and faculties concluded contracts with many enterprises on scientific and technical cooperation. During the current five-year plan it is planned to establish another five educational scientific production associations and the same number of sectorial scientific research laboratories

of Frunze Polytechnical Institute and the Kirghiz State University. And still it should be noted that the contact of science of the higher educational institution with production so far is of an unsystematic, fragmentary nature and often hangs on someone's initiative.

IT WOULD BE ADVISABLE, WE BELIEVE, TO ATTACH THE LEADING CHAIRS AND FACULTIES BY DIRECTIVE TO MINISTRIES, DEPARTMENTS, AND PRODUCTION COLLECTIVES OF THE REPUBLIC, WHICH ARE OF THE CORRESPONDING TYPE. THIS WOULD MAKE IT POSSIBLE TO USE MORE COMPLETELY THE SCIENTIFIC POTENTIAL OF HIGHER EDUCATIONAL INSTITUTIONS AND TO GIVE MORE SUBSTANTIAL ASSISTANCE IN THE CONDUCTING OF EXPERIMENTAL RESEARCH, THE PRODUCTION OF PROTOTYPES, AND THE INTRODUCTION OF THE RESULTS OF WORK IN PRODUCTION.

A solid pilot base is necessary for the successful development of science of the higher educational institution. For example, the student design bureau of Frunze Polytechnical Institute is satisfying only one-third of the needs of the research scientists of the institute. But why not expand pilot production, having turned over to the polytechnical institute one of the machinery and repair plants of the ministries, which have been included in the republic State Agroindustrial Committee?

Of course, the basic task of higher educational institutions is to train highly skilled personnel. But to consider science lessons here as something secondary is also an obvious misconception. In the statute on the higher school scientific research is named among the duties of instructors, for without this the sound training of modern specialists is inconceivable. Moreover, it is possible to teach them to think creatively only by enlisting students extensively in scientific research work.

Today more than 25,000 students of the day division of higher educational institutions are active in such circles and problem groups and in design and economic bureaus, are participating jointly with staff members of the chairs in the elaboration of economic contractual and state budget themes, and are aiding production.

The decisive policy of intensification and the saving of resources has been adopted in the country. The republic territorial-sectorial comprehensive goal program is being drawn up in accordance with the experience of the Leningraders. And it is a matter of honor of the scientists of our higher educational institutions to take a most active part in its implementation, having increased significantly the amounts of research and having brought its themes closer to the requirements of the national economy.

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MACHINE MECHANICS INSTITUTE AIDS GEORGIAN MACHINE BUILDING

Tbilisi ZARYA VOSTOKA in Russian 13 Feb 86 p 2

[Article by Doctor of Technical Sciences Iovel Dzhebashvili, acting director of the Institute of Machine Mechanics of the Georgian Academy of Sciences: "What the Impact Is, Such Is the Remuneration"; first paragraph is ZARYA VOSTOKA introduction]

[Text] Scientific and technical progress is regarded no longer only as a means of increasing the growth rate of the national economy, but also as a qualitatively new form of its development, which combines the structural reorganization of the units of the production process, which have been changed over to the path of intensification. It is natural that the outlined retoolings should in this case be based on the peculiarities of the specific regional nature.

The key role in this process belongs to machine building as the basis of the industrialization of the country. This is clearly emphasized in the precongress documents--the drafts of the new version of the CPSU Program and the Basic Directors of USSR Economic and Social Development. And not by chance in the plans for the 12th Five-Year Plan does the growth rate of machine building have to be increased by at least 1.5- to 2-fold, by devoting particular attention to the use of equipment of new generations, which is capable of yielding a multiple increase of labor productivity and of clearing the way for the automation of all the stages of the production process.

The Institute of Machine Mechanics of the Georgian SSR Academy of Sciences is one of the leading scientific centers of the machine building type in the republic. The themes of research and development, which are being fulfilled here, not only touch upon the problems of today, but are also aimed at the immediate and distant future. In this light much attention is being devoted to cooperation with industrial enterprises of the republic, of which one should first of all name the Kutaisi Motor Vehicle Works imeni G.K. Ordzhonikidze.

In addition to the renovation and retooling of the works, which are aimed mainly at the increase of the level of the mechanization and automation of the production sections, the decrease of the specific metal content of the motor vehicles being produced, and the development and introduction of new

technological processes, the decrease of the scale of foreign deliveries is envisaged. In this way the next step will be taken toward the changeover to a closed production cycle and the assimilation of new products, particularly a diesel engine, mechanisms, and assemblies of a fundamentally new type of specialized agricultural vehicle. Particular attention in this case should be devoted to the establishment of a laboratory base and its provision with advanced testing equipment, moreover, primarily with program control.

It is doubtless that the establishment and development of the laboratory base of the works should be carried out jointly with the Institute of Machine Mechanics, in the laboratories of which the basic operations on the development of promising motor vehicle equipment are concentrated. The laboratories of the motor vehicle type of our institute now are also cooperating with the department of the chief designer of the Kutaisi Motor Vehicle Works.

Our institute has much experience in cooperating with enterprises of the automotive industry on the scale of the USSR. At this stage our partners are the leading scientific and production centers of the USSR Ministry of the Automotive Industry--the Volga Motor Vehicle Works, the Pavlovsk Bus Works imeni A.A. Zhdanov, and others. There is every reason to believe that the experience of this cooperation will do a good service during the joint operations with the Kutaisi Motor Vehicle Works. The work on the optimization of the design parameters of the KAZ-4540 tandem trailer truck, which is used in operations in mountainous agricultural regions, is the central question of our joint activity at this stage.

The efficient use of equipment under some local conditions or others is governed by the existence of its corresponding specialized modifications. Under the conditions of agricultural production the availability of specialized motor transport will ensure the shortening of the time of the harvesting of the crop and will help to avoid spoilage and losses during transportation, while if it is taken into account that the size of the crop comes to several hundred million tons, the economic efficiency of the development of specialized motor transport for agriculture can be expressed by a significant sum.

The other operations, which are being performed by our institute in cooperation with industrial enterprises of the machine building complex of the republic on aspects of the Comprehensive Program of the Development of Scientific and Technical Progress, encompass the area of agricultural machine building. The implementation of the outlined program of scientific and technical progress in agricultural machine building for the future among other measures also envisages the meeting of the needs of the national economy and the population for means of small-scale mechanization. The solution of this problem in the republic has been assigned to the Kutaisi Plant of Motor Blocks, which is the basic producer of small tractor equipment and other agricultural implements. At present two models of a diesel engine, which are at the stage of laboratory stand modification, have already been developed and built at the institute.

The third direction encompasses theoretical research in the area of the dynamics of machines, concerning mainly machines of vibrating action.

In the republic the industrial field in the development of such machines is represented by the Tskhinvali Elektrovibromashina Plant, which is departmentally subordinate to the USSR Ministry of Heavy and Transport Machine Building. Scientific and technical progress at this plant during the period being forecast, along with the increase of product quality and the modernization of the production base, will find expression in the progress of scientific development in the formation of the theory of nonlinear systems of resonance vibrating machines and multimode subharmonic and superharmonic vibrating machines for technological processes, mainly at enterprises of the extractive industry.

As before, science remains the most important means of accelerating scientific and technical progress in all spheres of machine building production of our republic. However, the development of scientific and technical progress within the framework of the tasks being posed is possible only in case of a decisive turn of science toward the needs of production, for which in the republic the role of scientific centers should be stimulated to an even greater degree in the direction of the broadening of the scale of the scientific research being performed, which both has a technical orientation and is aimed at the elaboration of the theoretical principles of new technical directions and design and technological solutions. Here the priority role, as before, should belong to the development of the basic sciences: they are formed primarily at academic centers, the activity of which should also be turned to face production. Not by chance at the 27th Georgian CP Congress was particular attention devoted to the further development of basic scientific directions. The need to expand the practice of the work of scientific institutions on orders of enterprises was indicated.

The increase of the efficiency of scientific research and its practical return in light of the further development of the creative relations of science and production and the broadening of the scale of scientific developments requires the review of the themes of scientific institutions and their consolidation. Undoubtedly, cardinal changes in the organizational structure of scientific centers and the uniting of individual groups and laboratories into larger administrative units, which are capable of solving autonomously or collectively current and long-range problems of a greater scale, will also be necessary.

Such an approach will increase the responsibility of scientific institutions, their subdivisions, and individual performers. In this case the questions of material stimulation are acquiring particular importance. To a significant extent the extensive development of these levers will ensure the fulfillment of the provisions of the decree of the CPSU Central Committee, the USSR Council of Ministers, and the All-Union Central Council of Trade Unions "On the Improvement of the Remuneration of the Labor of Scientists, Designers, and Process Engineers of Scientific Research Institutions and Design Organizations of the USSR Academy of Sciences," which is being put into effect already during the current year, 1986.

How should the organization of the remuneration of the labor of scientists and engineers be improved? By the improvement of the planning of the wage fund and the establishment of standards of its formation, on the basis of the planned amounts of work, by means of the improvement of the organization of work and the increase of the efficiency of labor. In this case the improvement of the structure of both the management staff and enterprises themselves is acquiring particular importance--their units will be consolidated, a close connection of the remuneration of the labor of personnel with their personal contribution to the acceleration of scientific and technical progress will be ensured. It is characteristic that the introduction of wage increments will be carried out through the fulfillment of the most difficult and responsible jobs, which should be determined by the periodic--not less often than once every 5 years--certification of scientists, as well as through the increase of the role of bonuses, by the establishment of a closer dependence of their amount on the size of the impact, which is obtained by the national economy, and so on.

The practical implementation of the provisions of this decree will increase to an every greater degree the responsibility of both scientists and production workers in the development and introduction during the 12th Five-Year Plan of new equipment and technology, which conform in their indicators to the highest world level.

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BIOGRAPHICAL INFORMATION

DZHANTORE NURLANOVICH ABISHEV

Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR No 3, Mar 86 p 71

[Article under the rubric "Anniversary Dates": "The 50th Birthday of Corresponding Member of the Kazakh SSR Academy of Sciences D.N. Abishev"]

[Text] Corresponding Member of the Kazakh SSR Academy of Sciences Doctor of Technical Sciences Dzhantore Nurlanovich Abishev, academician secretary of the Central Kazakh Department of the Kazakh SSR Academy of Sciences, director of the Institute of Chemistry and Metallurgy of the Kazakh SSR Academy of Sciences, and a CPSU member since 1961, is 50 years old.

D.N. Abishev was born on 18 March 1936 in Telmanskiy Rayon of Karaganda Oblast. In 1957 after graduating from the Metallurgy Faculty of the Kazakh Mining and Metallurgical Institute he was sent to the Karaganda Scientific Research Institute of Coal and in 1959 transferred to the newly organized Institute of Chemistry and Metallurgy of the Kazakh SSR Academy of Sciences. In 1966 he defended his candidate dissertation. Subsequently he developed a scientific direction in the field of the thermochemical concentration of minerals and in 1982 defended his doctoral dissertation. In the same year he was elected a corresponding member of the Kazakh SSR Academy of Sciences and performed much work on the organization of the first regional department in Kazakhstan of the Kazakh SSR Academy of Sciences.

D.N. Abishev is a scientist who works at the meeting point of nonferrous metallurgy, inorganic chemistry, and ore dressing. The processes of the thermomagnetic concentration of pyrite-containing raw materials, the autoclave desiliconization of high-silicon materials, and the hydrothermal sulfiding of oxidized and composite ores of nonferrous metals, which received recognition in our country and abroad, were developed under his supervision. He was elected a member of the Bureau of the Scientific Council of the USSR Academy of Sciences for Physical Chemical Problems of the Concentration of Minerals and has 16 patents. He has published more than 150 scientific articles and 3 monographs, he has more than 40 inventor's certificates of the USSR.

D.N. Abishev is devoting much attention to questions of the complete processing of the crude iron ore of Kazakhstan and to the development of a technology for the conversion of the Karaganda Metallurgical Combine to Lisakovsk roasted magnetic concentrate with the obtaining of byproduct alumina

and phosphate products. The Central Kazakhstan Department, which he directs, is developing in every possible way the work in the area of organic synthesis and coal chemistry, mining and geology, which is aimed at the solution of important regional problems. On his initiative the Interdepartmental Council for the Coordination of Scientific Research of the Central Kazakhstan Department of the Kazakh SSR Academy of Sciences was established, a pilot experimental base is being developed on the basis of the Dzhezkazgan and Balkhash Mining and Metallurgical Combines, the Karbid Production Association (Temirtau), and others.

D.N. Abishev is performing much work on the training of scientists.

A member of the oblast party committee and a deputy of the Karaganda City Soviet of People's Deputies, D.N. Abishev is actively participating in the social life of the city and oblast and is devoting much effort to the formation of academic science in the region and its decisive role in the technical progress of Central Kazakhstan.

The party and government have rated highly the scientific and organizational activity of D.N. Abishev. He has been awarded the Honorary Diplomas of the Kazakh SSR Supreme Soviet and the Presidium of the Kazakh SSR Academy of Sciences and USSR medals.

We wish Dzhantore Nurlanovich new creative accomplishments in scientific organizational and public activity, good health, and fruitful work.

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NGUYEN VAN HIEU

Moscow IZVESTIYA in Russian 27 Apr 86 p 5

[Article under the rubric "Who Is Who": "Nguyen Van Hieu"]

[Text] Vietnamese scientist Doctor of Physical Mathematical Sciences Nguyen Van Hieu, president of the National Center of Scientific Research attached to the SRV Council of Ministers, was one of the winners of the 1986 Lenin Prize in science and technology.

He was born on 21 July 1938 in Ha Giang Province in the family of a school teacher. After graduation from Hanoi Pedagogical Institute in 1956 he began scientific research activity, specializing in problems of quantum physics. After 4 years he was sent to the Soviet Union to work at the Joint Institute for Nuclear Research (Dubna), where in an international collective of scientists of the socialist countries he performed series of important operations in the area of quantum field theory and elementary particle theory. For a large contribution to the development of physical science he was awarded the Order of Friendship of Peoples.

Having returned to Vietnam in 1969, Nguyen Van Hieu took part in the establishment of the Institute of Physics attached to the SRV State Science and Technology Committee. In May 1975 he became vice president of the National Center of Scientific Research in Hanoi, and after a month director of the established affiliate of the center in Ho Chi Minh City. After the SRV entered the Intercosmos Program Nguyen Van Hieu supervised the national program of the study and use of space. He was one of the organizers of the Soviet-Vietnamese space flight which was successfully carried out in July 1980. In September 1982 he was elected a foreign member of the USSR Academy of Sciences. Since early 1983 he has been in charge of the National Center of Scientific Research of the SRV. He enjoys great prestige in circles of the international scientific community. He has been invited to a number of foreign countries to give lectures.

Nguyen Van Hieu was awarded the Lenin Prize jointly with a group of Soviet scientists for the series of works "Inclusive Processes in Strong Interactions of High Energy Elementary Particles and the Discovery of Scale Invariance in These Processes."

ALFRED ALEKSEYEVICH KOLAKOVSKIY

Tbilisi ZARYA VOSTOKA in Russian 22 Feb 86 p 3

[Article by Doctor of Agricultural Sciences Professor Mamiya Gogolishvili and Doctor of Biological Sciences Noye Patiani: "A Prominent Botany Scholar. A.A. Kolakovskiy Is 80 Years Old"; first paragraph is ZARYA VOSTOKA introduction]

[Text] For many years of fruitful scientific teaching work and the training of scientists and in connection with his 80th birthday the Presidium of the Georgian SSR Supreme Soviet has awarded Corresponding Member of the Georgian SSR Academy of Sciences Alfred Alekseyevich Kolakovskiy the Honorary Diploma of the Presidium of the Georgian SSR Supreme Soviet.

Corresponding Member of the Georgian Academy of Sciences, Doctor of Biological Sciences, Professor, and Honored Figure of Science of the Georgian SSR and the Abkhaz ASSR Alfred Alekseyevich Kolakovskiy--a prominent Soviet botanist and an expert and researcher of the flora of Abkhazia--has celebrated his 80th birthday and 60th year of scientific research and teaching activity.

A. Kolakovskiy is well known as a scientist of broad specialization and profound erudition. His numerous works, which are devoted to various questions of floristics, geobotany, paleobotany, and the classification of plants, are distinguished by a great depth of research and are a valuable contribution to domestic science.

A. Kolakovskiy was born on 24 February 1906 in Kiev. In 1924 he graduated from secondary school in Kirovabad, while in 1930 received a higher education at the agricultural institute in Tbilisi.

Already during his undergraduate years A. Kolakovskiy displayed a great interest in botanical subjects. Starting already in his 2d year he took part in various expeditions and under the supervision of Professor A. Grossgym, a prominent researcher of the flora of the Caucasus, studied the flora and vegetative cover of Transcaucasia, particularly pastures, essential oil, rubber bearing, and other valuable plants, which are suitable for extensive use in the national economy of the country.

The love of botanical subjects determined subsequently the specialization of A. Kolakovskiy as a florist--classification and geobotany. After graduating from the university A. Kolakovskiy was an assistant lecturer of the Chair of Botany of the Azerbaijan Agricultural Institute. First in Baku, then in Kirovabad he continued at the same time as teaching activity to engage in the study of winter pastures and the identification of essential oil plants on the Caspian Steppes.

Since 1933 A. Kolakovskiy has been in Abkhazia: he has been studying the forests and mountain pastures in the basin of the Chkalty River. He worked at the Abkhaz Institute of Regional Studies (now the Abkhaz Institute of Language, Literature, and History of the Georgian Academy of Sciences), where he was in charge of a department. He is in charge of the Department of Botany of the Sukhumi Botanical Garden of the Georgian Academy of Sciences.

The materials of the study of the alpine pastures of Ochamchirskiy and Galskiy Rayons were the basis of his candidate dissertation, which was successfully defended in 1939 in Leningrad. The works of A. Kolakovskiy on the study of the vegetation of the Bzybskiy Chain and the pastures of Gagrskiy Rayon and the Ritsa-Auadkharskiy and Pitsundskiy Preserves were of great importance.

The basic four-volume work of A. Kolakovskiy, "Flora Abkhazii" [The Flora of Abkhazia], which summarizes the results of a large number of studies, was an especially valuable contribution to science. The labor-consuming and painstaking work on the compilation and preparation for publication of "Flora Abkhazii" lasted 12 years, starting in 1937.

At approximately the same time A. Kolakovskiy conducted studies of high mountain meadows of Abkhazia, the results of which were covered in various articles of his.

Great energy and a great capacity for work also enabled A. Kolakovskiy to begin immediately the performance of other, no less important work on the analysis of the flora and vegetation of Abkhazia, which is of great theoretical and practical importance for the use of the abundant natural resources of the republic in the national economy. This work became the basis of a doctoral dissertation, which was defended in 1947. A. Kolakovskiy received 5 years later the title of professor, while in 1955 he was elected a corresponding member of the Georgian SSR Academy of Sciences.

During the years of the Great Patriotic War A. Kolakovskiy performed much work on the identification and study of medicinal plants of Abkhazia for the needs of the defense of the country. In subsequent years he began more extensive territorial studies of the flora and vegetation with the encompassing of the entire Kolkhida from Tuapse to Adzharia. Another work, "Rastitelnyy mir Kolkhidy" [The Plant World of the Kolkhida], which contains abundant material on the physical geographical characterization of this region and a description of the vegetation and its resources with an indication of their importance for the national economy, was the result of the studies. In this work the author returned again to the question of geographical demarcation and, having at his disposal abundant material on the Kolkhida as a whole, drew up a geographical botanical demarcation of the entire Kolkhida.

A new period in the scientific activity of A. Kolakovskiy began in 1950. He set to work on the study of the fossil flora of Abkhazia of the Tertiary Period. In over 20 years he found the most abundant deposits of fossil flora in various regions of Abkhazia.

The profound knowledge of A. Kolakovskiy of both contemporary and fossil flora of Western Georgia enabled him to sketch a picture of the formation and development of the flora and vegetation of this period during the Tertiary Period, which is of great importance for the understanding of the directions of the development of its present flora. As a result of the study of the fossil flora of Abkhazia, which is unique for Eurasia, about 600 species of plants, of which several tens are new for science, were described. In his works A. Kolakovskiy closely links theoretical questions with practical problems. An example of this is the fundamental work "Plyutsenovaya flora Abkhazii" [The Plucene Vegetation of Abkhazia] and other works.

However, the work of A. Kolakovskiy in the field of paleobotany is not limited to studies of only the Tertiary flora of Abkhazia. He generalized the existing data on the flora of the Caucasus and published the article "The Fossil Dendroflora of the Caucasus," which contains materials on nearly 600 species of plants. Later, with his characteristic energy, A. Kolakovskiy jointly with paleobotany scholars, who were involved with the study of Caucasian fossil flora, published a work--the two-volume "Katalog iskopayemykh rasteniy Kavkaza" [A Catalog of Fossil Plants of the Caucasus], in which a description of all the species known prior to 1973 with an indication of the location and degree of reliability of identification is cited.

In recent times, in connection with the accumulation of new material and the need for the revision of the existing material, A. Kolakovskiy did very labor-consuming work on the republication of his four-volume work "Flora Abkhazii," which after revision was significantly supplemented with new data. This fundamental work is a reference book for specialists who are studying the flora and vegetation of the Kolkhida and the regions closest to it.

At the same time A. Kolakovskiy engaged in the study of the flora and vegetative cover of the preserves of Abkhazia. The importance of such studies consists not only in the specification of the species composition of the flora and the structure of the phytocenoses, but also in the search for forms and methods of the preservation of the most valuable species of relic flora, which are on the verge of disappearing. The establishment of the dynamics of the development of the basic phytocenoses and the replacement of some varieties by others, which cannot but be of practical importance, is also very valuable.

A. Kolakovskiy is also working successfully in the field of the classification of individual families of herbaceous plants.

In addition to much scientific work, Professor A. Kolakovskiy is also performing teaching activity and is devoting much time and labor to the training of young scientists, with whom he has always generously shared his abundant knowledge and experience. Many candidate and doctoral dissertations have been defended under his supervision.

A. Kolakovskiy has been awarded the Badge of Honor and many medals.

Alfred Alekseyevich Kolakovskiy enjoys great prestige. He is respected and loved not only as a scientist, but also as a person of principles and exceptional spiritual warmth.

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MIKHAIL NIKOLAYEVICH LIVANOV OBITUARY

Moscow IZVESTIYA in Russian 30 May 86 p 6

[Article: "Academician Mikhail Nikolayevich Livanov"]

[Text] Soviet physiological science has suffered a serious loss. After a long serious illness Academician Mikhail Nikolayevich Livanov, an outstanding Soviet neurophysiologist and one of the founders of domestic electrophysiology, has died.

M.N. Livanov was born on 20 October 1907 in Kazan. After graduating from Kazan State University, from 1932 to 1947 he was in charge of the Laboratory of Electrophysiology at the Institute of the Brain of the USSR Academy of Medical Sciences, then worked at the Institute of Biophysics of the USSR Ministry of Health. In 1951 he organized the Laboratory of Electrophysiology of Conditioned Reflexes of Animals and Man at the Institute of Higher Nervous Activity and Neurophysiology of the USSR Academy of Sciences, which he headed until the end of his life, and for long years managed the Department of Problems of Memory at the Institute of Biophysics of the USSR Academy of Sciences.

During all his scientific activity M.N. Livanov combined theoretical assumptions with the problems of practical biology and medicine. His research played a significant role in establishing the great sensitivity of the nervous system of man to ionizing radiation. The method of electroencephaloscopy, which was developed by him, is an outstanding contribution to Soviet science. The use of computers in electroencephaloscopic research led to the establishment of a new direction--the study of the functional organization of the brain, for which the idea of the spatial synchronization of the potentials of brain structures was the basis. M.N. Livanov was one of the first in the Soviet Union to begin to study the functional organization of the cortex of the brain at the neuron level. The study of the problem of memory was a promising direction of his scientific research. For the fruitful development of the science of higher nervous activity M.N. Livanov was awarded the I.P. Pavlov Prize and Gold Medal of the Presidium of the USSR Academy of Sciences. He was an outstanding scientist with a world name, whose works constitute a brilliant page in the history of physiology.

M.N. Livanov worthily represented Soviet science at international congresses and conferences. He was a member of the International Brain Research Organization (IBRO), performed much work as a member of the Bureau of the Physiology Department of the USSR Academy of Sciences and a member of the Board of the All-Union Physiological Society, and was editor in chief of the journal USPEKHI FIZIOLOGICHESKIKH NAUK of the USSR Academy of Sciences.

M.N. Livanov was a CPSU member since 1940. His scientific activity was commended by many orders and medals.

M.N. Livanov was distinguished by great modesty and great demandingness on himself and his associates. The blessed memory of M.N. Livanov--a talented manager, a kind and sympathetic person--will remain forever in our hearts.

[Signed] The Presidium of the USSR Academy of Sciences, the Physiology Department of the USSR Academy of Sciences, the Institute of Higher Nervous Activity and Neurophysiology of the USSR Academy of Sciences, the All-Union Physiological Society imeni I.P. Pavlov

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